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A

DISSERTATION

ON THE

Antiquity of the Earth,

READ AT THE ROYAL SOCIETY, 12th MAY, 1785.

> Το αληθεύειν μονον δυναται τους ανθρωπους ποιειν θεω παραπλησιους
>
> PORPHYRY.

By the Rev. JAMES DOUGLAS, F.A.S.

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ASTOR, LENOX AND
TILDEN FOUNDATIONS.
1897

PREFACE.

METAPHYSICAL truths can only be eſtabliſhed, by producing effects from correſponding cauſes; and though we may confront ſuch demonſtrative evidence with the immutable laws of mathematical deciſion, we muſt be ſenſible that there will ſtill remain ſome pretence for

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for doubt; thus the baſis of that knowledge, which on theſe principles we have been long labouring to accompliſh, will become an endleſs toil, an endleſs ſource for controverſy: and having the paſſions and the prejudices of mankind to combat, which mathematical certainty can alone effectually ſuppreſs, we muſt content ourſelves only with making converts of thoſe who have minds ſufficiently expanſive to liſten to hypothetical arguments, without the ſhackles of Euclid, and the vanity of diſplaying their own learning and pedantry.

Much may be ſaid in favour of that reſtriction, which the human mind would be ſubject to, when on the flight of imagination it may be induced to ſoar to the dangerous regions of conjecture; but were we only to admit mathematical argument into our inquiries, men would be reſtrained from their ardour of conception, and becoming languid in their purſuits after knowledge, they would ſink into a laſting ſupineneſs: yet after all our tedious reſearches, miſerably incapacitated as we are, we muſt be ſatisfied with a limited approach to firſt cauſes, and at a reſpectable diſtance, contemplate with a pious wonder, the inſcrutable works of the Almighty.

The following Diſſertation has been framed from a multiplicity of authentic materials which relate to the natural Theory of the Earth, and much ſerious inquiry into the writings of learned men, who have been diffuſe on the ſubject. Polemical references only confuſe and diſguſt the reader of taſte and diſcernment, I have therefore concentred a few ſelect facts into a ſmall compaſs.

The Smaragdine tables of Hermes Treſmegiſtus, who is ſaid to have flouriſhed in the time of Joſhua, would have little weight in a plain relation of diſcoveries in the foſſil kingdom; and as the ΠΡΟΤΟΝ ΔΕΚΤΙΚΟΝ or firſt cauſe of ſolidity, is not yet explained by any of our learned chymiſts, I have therefore only preſumed to draw my concluſions from the moſt obvious effects, and which ſhould be preſented to the human mind with as much clearneſs and energy as the writer is maſter of.

J. DOUGLAS.

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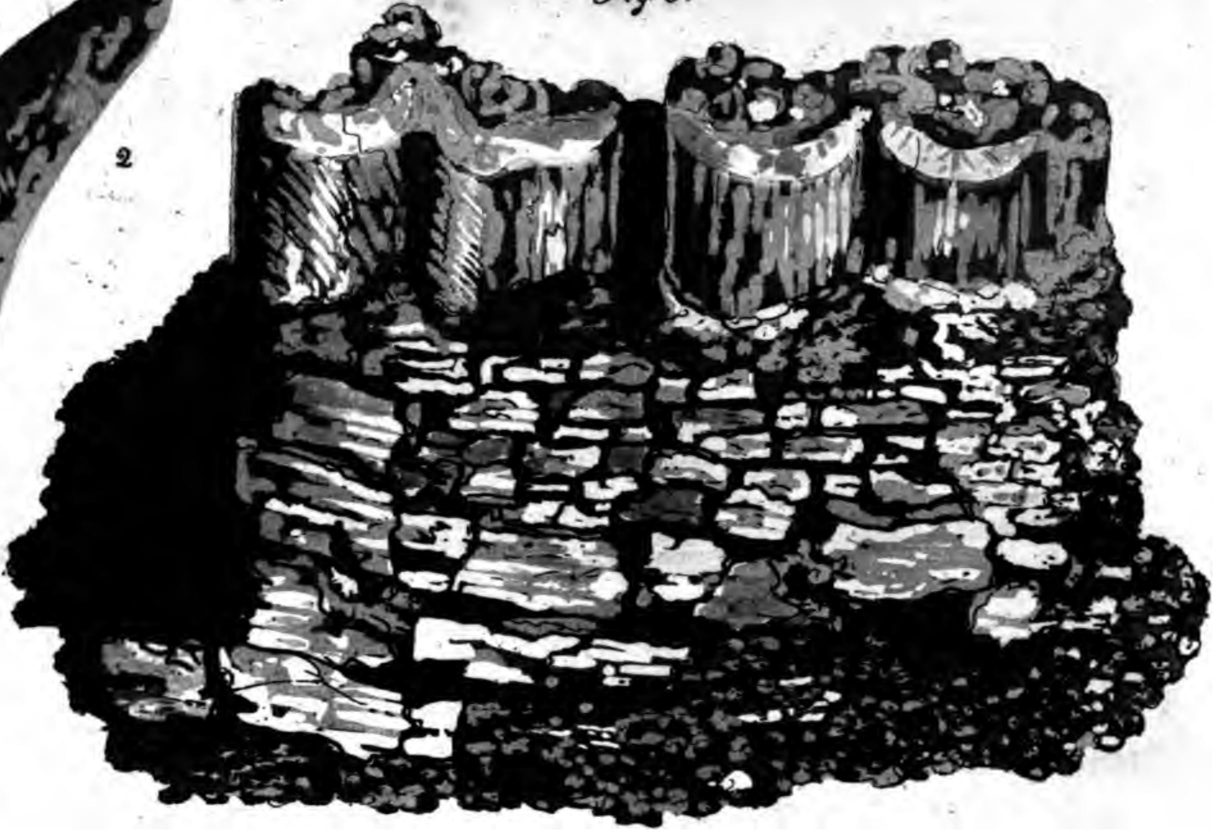
Fig. 1.



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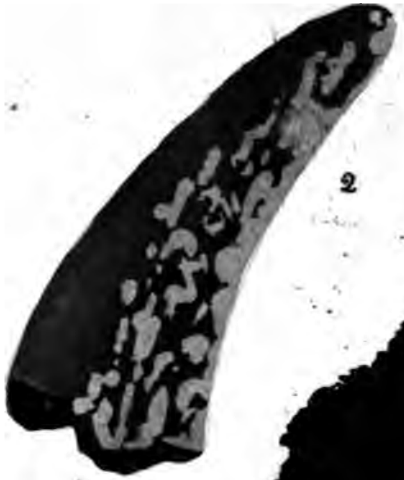

A DISSERTATION ON THE ANTIQUITY OF THE EARTH.

MANY extravagant notions having been lately propagated on the ſubject of animal and teſtaceous petrifactions; I have preſumed to tranſmit to this learned Society ſome important facts, which may poſſibly admit of *data* for a more comprehenſive inquiry into theſe phœnomena.

On the 18th of June, 1773, an excavation was made in the yard of Mr. James Beſt, of Chatham, for the foundation of a ſtore-houſe. The labourers, at the depth of twelve feet, diſcovered the bones of a very large animal. They were depoſited in a ſtratum of drift or river ſand, blended with a kind of clay, of a yellowiſh grey tinge. The ſuperior ſoil, within a few lines of the ſtratum which covered the bones, was a compact and native brick loam, with horizontal veins of a blackiſh hue running through it. This vein of loam extends in an horizontal direction through the town of Chatham, about twenty feet above the level of the river Medway at high water-mark, and about one hundred yards from the ſtrand at the ſame level.

By the poſition of the bones, and the fragments that were reſerved, they appear to have belonged to one entire animal. Thoſe which I procured conſiſted of an under jaw, with two of the *molares*, two inches broad, a curvated tooth, the drawing here ſubjoined being a fac ſimile of both, PLATE I. vide FIG· 1 and FIG. 2, and which in the year 1781 I preſented to the muſeum of Sir Aſhton Lever.

Lever. I alſo preſerved the fragments of the blade-bone, which bone was two feet long, ten inches wide at the broad end, and four inches at the ſmalleſt; theſe, with ſeveral fragments of tuſks and bones, I have here ſubmitted to the inſpection of the Society. The remaining bones of the animal were carted to a ſmall diſtance from Mr. Beſt's yard, and ſcattered with the ſoil over a paſture ground, excepting ſome few ſpecimens which Mr. Beſt gave orders to be ſaved, and which have ſince been miſlaid: from the minutes, which are in my poſſeſſion, taken on the ſpot by the Reverend T. Auſtin of St. Margaret's, near Rocheſter, and late minor Canon of that cathedral, they appear to have conſiſted of ſeveral ends of joint bones, parts of the ſhank bones, ſome a foot and upwards in length; a large rib, three inches broad, and the ſmall end towards the point, of a rayed or coarſe yellowiſh tuſk, about three inches in circumference, with ſeveral of the vertebræ

THE bones are deprived of their ANIMAL SALT*, and

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* THE expreſſion of animal ſalt was here propoſed as a general term for animal matter in the ſenſe of our old writers, the *proxima*

and ſome, eſpecially the jaw, are permeated with a lapideſcent matter. As their ſize greatly exceeded thoſe of our common domeſtic animals, particularly the teeth, they were ignorantly reported to be

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ma materia et συναιταιον *Soliditatis* of all bodies, whether animal, marine, vegitable, or foſſil. As I have had reaſons for changing the expreſſion, I thought proper to ſhow cauſe why it was ſo uſed; and eſpecially to prefix a note on the ſubject, as the expreſſion was altered ſince the paper had been publicly read at the Royal Society.

ANIMAL SALT may very properly be admitted as a το συναιτιον i.e. a concommitant cauſe of ſolidity, with their other principles of ſulphur, and ſpirit or mercury among the older chemyſts, before Boyle and Homberg's time : the three together being always in their opinion neceſſarily co-exiſtent under the ſeveral appropriated peculiarities of reſpective proportion and modification; as hypoſtatic principles of each ſort of ſubſtance, on this globe at leaſt; whether animal, vegetable, or *foſſil:* which they termed their *tria prima,* and ſeemed to think that it was the peculiar—ſpirit—mercury,—or ſpecial modification of this, that gave the ſpecific character to the other two principles, requiſite alſo for the diſtinct conſtitution of each kind of ſubſtance, which derives its ſpecific qualities from ſuch combination, as they fancied, of theſe primary principles. Salt indeed appears to have been in their ideas the principle which chiefly afforded conſiſtence and a bond of union to the others. The animal Salt—Sulphur—Spirit,—were each of them of a peculiar kind only ſpecific to that order of ſubſtances: the vegetable the ſame; and the foſſil the ſame;

be of an elephant, and aſcribed to one of thoſe which writers without reaſon ſuppoſed to have been tranſported into this country by the Emperor Claudius.

ſame; and by ſome were believed to be ſo originally and eſſentially, conſtituted or formed at the creation of the world.

A MORE modern ſet of chemiſts, after Homberg's time, added to the other three above mentioned, Earth and Water. The former of theſe two they diſtinguiſh from Salts, by its not being diſſolvable in water, and inſipid; the oppoſite of both of which qualities all ſalts have: and though they, and likewiſe a ſtill more modern ſet of ſyſtematiſts in chemyſtry, do not deny the ſolidity of ſaline ſubſtances, and that they very often and remarkably add to the conſiſtency, ſolidity and firmneſs of other bodies; yet they conſider ſimple earth as more peculiarly the ſolid matter of our mundane ſyſtem; being more permanent, and unſuſceptable of change than ſalts, or any other bodies we have acceſs to; whether however the earthy matter might not be made, by certain operations, to aſſume the characters of ſalts, and theſe, as well as it, be converted into others, or any of the other, now received principles of bodies among the more modern chemiſts, is a ſubject no way clearly aſcertained; but may very properly admit of inquiry.

IT ſhould therefore ſeem, that the *proxima materia* of bodies, muſt be that combination of principles, which immediately conſtitutes their peculiar ſolid ſtructure, and not any ſeparate ingredient of the compoſition, or principle diſtinct from the reſt; however important beyond the others it may ſeem for the general effect: hence it muſt be neceſſarily admitted that the ancient

Claudius. The human mind, on theſe occaſions, being but too often tempted to yield to the marvellous, the *molares* in queſtion were by many learned

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chemiſts aſſigned to SALTS a pre-eminence, in affording the uniting power, which gives conſiſtence to the maſs ariſing from the occaſional ſpecific junction of the three principles; each of which however was by them ſuppoſed to modify the other two, and to be modified by them mutually, as the ſpecific nature of the body, they thus immediately conſtitute, requires: ſo that on all occaſions they imagined them to be of, and mutually to communicate to each other, a modification of exiſtence, peculiar to that ſpecies of bodies they on every occaſion conſtitute, whether in the Heaven or the Earth, in animal, vegitable, or foſſil ſubſtances; doubtleſs a ſtrange jumble of things!

THE primary elements of all bodies, according to the moſt ancient philoſophers and chemiſts, were four, Fire, Air, Water, and Earth. The chemical principles were Salt, Sulphur, and Mercury; before the end of the laſt century, Earth and Water were added. But, ſince the middle of this century, the chemiſts have moſtly dropped the idea of elementary principles of bodies being within our reach of diſcovery; and have adopted an enumeration of the moſt ſimple parts we can perceive bodies to be reſolvable into: which at preſent ſeem agreed among them to be Phlogiſton, which anſwers to ſulphur or the inflammable principle of the ancients, Air, Water, Saline bodies, Metallic bodies, and Earth: without pretending to aſſert that any one of them is an abſolutely ſimple and uncompounded body, learned men, conſidered as ſimilar to thoſe which are recorded in the Philoſophical Tranſactions, No. 403, by Sir Hans Sloane; whereas their form and ſize ſhow them to be in every reſpect diſſimilar. An elephant has only one grinder on each ſide; this animal has three; and their ſtructure ſo very different, theſe being of a grameniverous and carniverous kind, and in compariſon ſo much ſmaller, that all analogy whatever muſt be out of the queſtion. Judging therefore of the difference in the ſtructure and ſize of the teeth of an animal that is both grameniverous and carniverous, and of the proportion of the other bones, I did not heſitate to decide on theſe animal remains to

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dy, or that ſome of them may not be the reſult of only variouſly modified combinations of other bodies; perhaps of theſe ſame, or other yet undeſcript claſſes of bodies.

THESE thoughts, as they ſtarted, have been thrown together not for the purpoſe of giving information, but to give a diſtinction between the terms applied by the ancients and moderns to the eſſential and component parts of bodies, as far as their ideas ſeem to have led them to interpret what might be ſaid upon thoſe ſubjects, and which I think neceſſary to ſubjoin in this place, to aſſign a reaſon why I adopted the word Animal Salt, as a general term againſt which ſome of our modern chemiſts have militated.

have belonged to the Hippopotamus; but to be more accurate, and to remove all doubt as to the authenticity of a diſcovery of this conſequence in our iſland, I compared the foſſil *molares* with thoſe of the recent ones in the jaw of the above animal in the Muſeum at Leiceſter Houſe; the confirmation was manifeſt: there was very little difference in the ſize, and no difference in the ſtructure; excepting that the foſſil ſeemed to have belonged to an older animal, which in maſtication had worn the teeth flat, or rather obliquely on their interior ſide towards the mouth. The Hippopotamus has two ſmall curvated teeth between the two projecting lower tuſks; and on PLATE I. comparing of FIG. II. which is the boney part that enters the ivory, it will be found perfectly ſimilar to the recent tooth of the ſaid animal. I ſhall now beg leave to wave all further detail as to the typical marks of theſe bones, and permit them to aſſert their identity with thoſe gentlemen, who are ſkilled in the ſcience of comparative anatomy: if therefore the following concluſions from this diſcovery may in the ſmalleſt degree tend to explain the cauſe of theſe phœnomena found in the bowels of the earth, or to eſtabliſh any principles for the advancement

advancement of the ſcience of Coſmography, the time which I have employed in many practical reſearches of this nature, will I truſt be of ſome ſervice, and I hope juſtify me in a further proſecution of this ſtudy.

THESE hippopotamic remains being diſcovered petrified and entire, in a ſoil which had been formed by the reſidue of the waters, it ſhould ſeem that they muſt have been depoſited by this cauſe. The account of the deluge in holy writ might incline the learned to ſuppoſe that this animal had been floated from thoſe regions, which in reſpect to climate, were congenial to its exiſtence, and to have been left on the ſpot where it was found in its foſſil ſtate; but when we conſider the great diſtance of the Medway from the Nile, or other rivers near the tropics, where theſe kinds of animals are now known to inhabit; and when we have no authority from the Pentateuch to conclude that any extraordinary convulſion in Nature had impelled animals at that period from their native regions to countries ſo remote, ſo we have no natural inference for concluding that the deluge was the cauſe of this phænomenon.

HAD the deluge ſtranded animals under theſe circumſtances, the ſuperior parts of the chalky cliff where theſe foſſil remains were found, would exhibit many palpable effects to have eſtabliſhed this cauſe; with the retreat of the waters, animal as well as marine productions would have been alſo depoſited; nor would the partial ſtratum of native loam extend itſelf to a certain altitude on the chalk; which, as being ſo evidently the effect of alluvion, the very ſummit of the neighbouring land would produce ſome marks of this nature; ſince we are inſtructed that the waters of the deluge covered the whole face of the earth: at all events therefore we muſt conclude, that theſe animal remains were depoſited at an epoch ſeparable from that of the deluge as recorded by Moſes; but when evidence ſo powerfully militates againſt this inſtance, and that the ſtratum of the river ſoil is only diſcovered twenty feet above the level of the river at high water mark, and one hundred yards from the ſtrand, on the ſame level in which the animal was found, it muſt conſequently be admitted by rational deduction that theſe hippopotamic remains were placed in that ſtratum by the

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river, which at ſome remote period had laved thoſe heights; and hence it will naturally follow, that as the Hippopotamus is known to be the inhabitant of muddy rivers, like thoſe of the Nile and the Medway, it ſhould therefore argue that this animal was the inhabitant of theſe regions, when in a ſtate of climature to have admitted of its exiſtence.

If from the combination of theſe facts I ſhould be permitted to argue with freedom, I have no doubt but much prejudice will be obliterated from the minds of many learned men, who, not having opportunities of making practical diſcoveries themſelves, have been induced to adopt many ſyſtems of the natural theory of the earth, that have been founded on caprice, and ſome apparent truths but careleſsly defined, and as careleſsly eſtabliſhed: it is therefore my intention to prove, from the critical obſervation made on the local diſcovery of theſe Hippopotamic remains,

That this iſland has been under a warmer influence of climature than at this preſent æra.

That the animal called the Hippopotamus, the inhabitant of the continent of Africa, muſt have been depoſited on the ſtrand of the river Medway by waters, ſeparable from that epoch recorded in holy writ, which ſubmerged the world in forty days.

*That the earth was once endued with a power of tranſmuting bodies into ſtony or hard ſubſtances, which it ſeems no longer to poſſeſs** *; or that by the undoubted teſtimony of theſe petrified animal bones, they muſt have been interred much anterior to any written record, from ſome extraordinary convulſion of the globe.*

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* I beg to obſerve, when I ſpeak of petrifaction, that I mean a quality which the earth appears to have had of indurating bodies, by the operation of certain acids, and not of that quality with which certain ſoils are endued, of depoſiting an earthy or ferruginous incruſtation on the bodies encloſed in it: or of that power which produces ſparry and ſtalactical matter, and which is ſometimes found to encloſe heterogenious bodies; in ſhort, of that power which is known to come within the ſcope of human definition, and to which a phyſical cauſe can be aſcribed.

As it is neceſſary on abſtruſe diſquiſitions to ſtate ſome relative principles, I ſhall here ſelect three caſes from a multiplicity of authentic and combined truths of the ſame nature, which I flatter myſelf will ſtand the teſt of the moſt ſcrupulous phyſical inquiry.

CASE I.

From the ſpecimens of foſſil elephants tuſks, which I have ſeen in the Emperor of Germany's Cabinet of Natural Curioſities at Vienna, and in other Muſeums, I obſerved that ſeveral were rendered throughout calcarious[*], while others were entirely changed to the hardeſt black agate; the concluſion will therefore follow, that an immenſe length of time muſt have elapſed to have cauſed the abſorption or decompoſition of animal matter from the tuſk, and to have rendered it ſufficiently calcarious for the homogeneous ſubſtance with which it was ſaturated; for it is a known law in nature, that all bodies firſt become calcarious or friable before they enter into a lapideſcent ſtate. A reply may here be poſſibly made, that it requires but a few number of years to perform this operation; but this argument cannot ſubſiſt, when it is conſidered, that the power which ſo ſhortly produces this effect, will alſo decompoſe the more ſolid parts of the body; and I believe I may venture to propoſe, that no ſoil has ever produced bodies at any given time, ſo completely calcined, and in ſo compact a ſubſtance as the foſſil elephants tuſks which are diſcovered in the bowels of the earth over all Europe.

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[*] The property which the earth has had of rendering animal ſubſtances calcarious, ſeems to be entirely undefined by any of our learned phyſicians. That agent which has operated upon theſe ſubſtances muſt in its effects be ſimilar to the operation of fire. It has by ſome chemiſts been attributed to acids.

For the further illuſtration of this principle, I ſhall preſent the following *data:* gravelly and ſandy ſoils, which often abound in the vitriolic acid, will in a ſhort ſpace of time entirely conſume or decompoſe animal ſubſtances; whereas chalky or marly ſoils, not having the above quality in any like proportion, will preſerve bones* when ſecure from the filtration of water,

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* As many would wiſh in this diſquiſition to refer to the compo-

ter, to any length of time, replete with their animal matter. Having had various opportunities of finding human bones in many different ſoils, with the date of their depoſit interred near them,

component parts of bone, which might poſſibly be the means of cauſing freſh lights to be thrown on theſe foſſil phænomena, I have here ſubjoined the remarks of a very ſkilful phyſician, Dr. Beugo, of Rocheſter, to whoſe friendſhip and acquaintance I am here happy to acknowledge much information and delight.

A FIBRE in phyſiology may be conſidered under the ſame relation to the other parts of the animal body, that in geometry a line is to other dimenſions, i. e. length without breadth or thickneſs; and therefore cannot be ſuppoſed, under the idea of a ſimple fibre, to occupy any ſenſible latitude, or be diviſible in its breadth or thickneſs. It cannot be ſuppoſed viſible, even with the aſſiſtance of the higheſt magnifier; as we find that there are animals ſo minute that the niceſt microſcope cannot render them clearly diſcernible; while at the ſame time, the fibres that compoſe their ſlendereſt parts muſt be inconceivably ſtill more imperceptible; and may be ſuppoſed to be conſtituted of two or more elementary or earthy particles placed lengthways, without the intervention of any thing but that cement or gluten, which preſerves their relative poſition with each other. All fibres of ſuch magnitude as to be diſcernable to our ſenſes, are evidently upon ſcrutiny diviſible into finer and ſtill finer really conſtituent fibres.

THE animal fibre is elaſtic, ſo as to fly back when bent or ſtretched, them, and one in particular, which among a variety of relics found in a grave, produced two deciſive *data*, I ſhall here take the liberty to intro-

duce

ſtretched, to recover its former direction and degree of extent; yet, without the acceſſion of nerves, the ſolid fibre is altogether inſenſible: and from what has been ſaid it muſt appear, that the ſimple fibre is without blood, and can have no cavity in it, and that it is ſolid. The ſolid fibre is ſomewhat heavier than water, as will appear from obſerving, that all the ſolid parts of animals, before they have undergone putrefaction, ſink in water. The animal fibre is alſo chiefly of a white colour; and, as a ſolid, diſcovers under the chemical analyſis, that in its compoſition are contained Air, Water, Oil, Earth, and a ſmall portion of Iron.

The more firm and ſolid the conſtituent fibres of any part of an animal are, that part will yield the greater proportion of air, which is always elaſtic, when diſengaged, though quieſcent and apparently inelaſtic in its combined ſtate. So great is the quantity of air that may be detatched from the ſubſtance of bones, as to occupy a ſpace 200 times the bulk of the bone it was diſengaged from. Though the air, in its non-elaſtic ſtate in hartſhorn, did not occupy more than a ſeventh part of the whole bulk of the horn, it was found when reſtored to its elaſtic ſtate, to occupy 234 times as much ſpace as its reſpective portion of horn did.

The quantity of water reſpectively contained in bones is not eaſily determined with preciſion; as it will readily appear, that its quantity will be leſs, proportionably to the hardneſs and ſolidity of the bone; I ſhould gueſs however that it cannot exceed duce them as perfectly eſſential to the matter of the preſent diſquiſition. Having therefore with the greateſt circumſpection, to guard againſt adventitious

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a fourth part of the weight of the bones; and the bulk of water will bear the proportion to the weight of the water, of that of a cubic inch for every 251, 42 grs. of water, contained in the bone; and having previouſly aſcertained the bulk of the whole original ſubſtance of the bone before its water was abſtracted, the difference ariſing from the bulk of the water being ſubſtracted from this, will give the bulk of the bone without that water, &c. taken from it.

By digeſtion in the vapour of water, by boiling it in water, but more perfectly, in Papin's digeſter, almoſt, if not entirely, the whole of a bone, but eſpecially of a cartilage, may be reduced to a jelly; or indeed the greater part of every bone ſeems to be jelly, or a gelatinous ſubſtance: for hartſhorn will inſpiſſate or make a jelly of ſixteen times its own weight of water, and ivory fifteen times its weight. Two-thirds of the bones of a fetus are gluten: of an adult one-half, and of an old perſon a leſs proportion. In the early ſtages of the fetus, the ſolid parts are nothing but a gluten. The whole ſubſtance of a very young lamb, has, by a gentle heat been boiled to a mucilage.

When the gluten of bones is extracted by the force of fire or of the air, they ſtill retain their original form; though they fall to duſt at the ſlighteſt touch of the finger: and bones thus prepared are the fitteſt ſubſtances for many chemical inſtruments, particularly for the conſtruction of veſſels capable of ſuſtaining violent ventitious circumſtances from the upper coating of the earth, opened a barrow in a chalky ſoil, which contained human bones I found among

many

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violent heat without cracking. By reſtoring to bones their former gluten, they recover their original hardneſs, form, and ſtructure: their conſiſtence is likewiſe recovered, by drenching them with water or oil. Scraped bones, yield, by boiling in water, a gummy like jelly, a-kin to carpenter's glue, of which ſort of ſubſtance the greateſt quantity and ſtrongeſt kind is procured from ſkins, tendons, and cartilages. On this gluey matter depends the elaſticity of the animal fibre, and perhaps to a peculiar ſtate of it, the peculiar irritability of ſome parts and conſtitutions, is due.

The gluten of bones putrifies, and therefore becomes in greateſt part volatile; and by this proceſs, or the force of fire, it may be ſo entirely diſſipated as to leave in the bone nothing but a friable earthy ſubſtance, if not diſturbed, retaining ſtill its former extent and figure, and by the addition of oil, water or gluten, which it greedily drinks in, again recovers its hardneſs and conſiſtence.

In diſtillation, the animal gluten yields water, volatile ſalt, ſome marine ſalt, a fixed alkali, and a phoſphoric oil (which laſt may chiefly be procured from bones,) and earth; and this gluten is alike from whatever part of an animal it is extracted; being always the ſame inodorous, inſipid ſort of ſubſtance, yielding as juſt now ſaid, water, oil, ſalts, from the force of fire and earth. Though the oil ſeems in ſmalleſt proportion, it appears to have

many rich ornaments of a female, the fragments of an ivory armilla and a coin of the Emperor Anthemius, who flouriſhed A. D. 447.—
The

the greateſt power, in affording tenacity and firmneſs to the bone. The proportion of the oil ſeems not yet eſtimated.

Though the gluten contains oil, as a conſtituent of its compoſition; yet oily ſubſtances have no action on gelatinous matter, nor can rectified ſpirit of wine diſſolve it. This ſpirit has no effect upon it when dry, and takes only part of the water from the gluten when liquid; and in ſo doing coagulating the jelly, may with much probability be attributed the thickening of the lymph, and the ſtuffing and burſting of the lymphatic veſſels; from whence extravaſation and dropſy enſue, and, in ſhort, moſt of the diſtinguiſhing diſeaſes, to which thoſe accuſtomed to much uſe of ſpirituous liquors are ſubject.

The Earth of Bones, as of all other parts of the animal body, is of the kind denominated calcarious, though it is not immediately calcinable into quick lime; but when it has been diſſolved by the vitriolic acid, with which it forms a ſelenitic earth, and the acid is again ſeparated from this ſelenite, by means of a fixed alkali, the precipitated earth will then be found calcinable into quick lime: but when the animal earth has undergone no farther alteration than what ariſes from the ſimple force of fire, in expelling all the volatile parts, it cannot be reduced, even by the moſt intenſe heat, to the ſtate of calx or lime; but may in that condition, by very high degrees of heat be converted into a white opaque glaſs, ariſing from the phoſphoric ſalt not yet entirely ſeparated from it, being of a peculiarly
powerful

The bones which were entire, during the ſpace of thirteen hundred years were not calcinated, but contained almoſt as much gluten or animal

powerful tendency to render earthy ſubſtances vitreſcible, of all which the calcarious reſiſt vitrification moſt obſtinately.

Upon the total amount of obſervations made on ſolid animal matter, it appears that it requires for the ſeparation of the other principles of its compoſition, from its ſimple earth, a very intenſe degree of fire, or, more effectually a very long expoſure to the effects of the air: for though the bones of mummies, which have been preſerved for more than a thouſand years ſtill retain the animal gluten, yet bones which have for many ages been expoſed to the free action of air and paſſage of moiſture, are ſo compleatly deprived of their oil and watery parts, as to be left in the ſimple ſtate of friable earth, which when dry, though it preſerves the original form, crumbles with the gentleſt touch into powder, and incoherent particles not diſſolvable in water.

Iron, or at leaſt that kind of earth, which by combination with phlogiſton produces iron, is to be found in every integrant part of an animal; but in leaſt quantity in the bones, though in all in a very ſmall proportion. It probably anſwers a variety of purpoſes in the animal œconomy; various according to the various fancies of phyſiologiſts: ſuch as to give, as ſome conceive, a greater degree of firmneſs and ſolidity to the harder parts; according to others, to contribute to the colour and formation of the red globules of the blood, and their momentum, to aſſiſt towards the attrition of the blood and production of heat, and perhaps in the action of acids upon it in the ſtate of calx in the fluids, throwing out heat and inflammable gas for various purpoſes in the ſyſtem, and many other ſuppoſitions, too tedious now to mention or conſider.

phlogiſton

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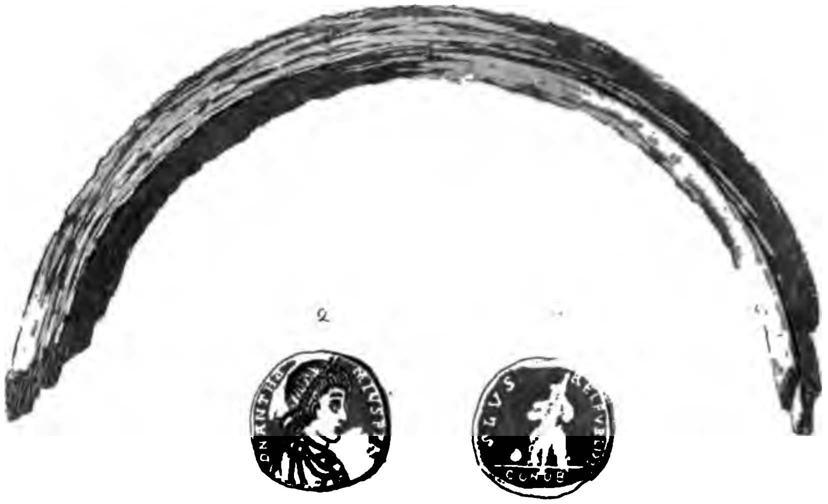
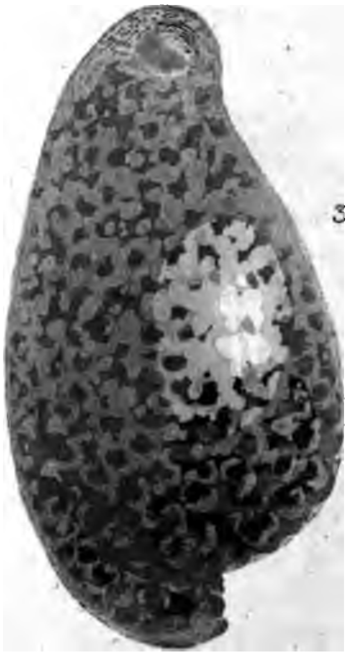
Pl. II · p. 21

Fig. 1





D. fec.t in Aqua Tinta.

phlogiſton as a recent bone; and the ivory armilla, which was not a quarter of an inch in thickneſs, alſo preſerved its animal ſalt*, vid. PLATE II, FIG. I. If therefore I have the moſt poſſitive aſſurances from a ſimple chemical experiment, by paſſing through the fire, the calcarious ſubſtance of the foſſil tooth of an elephant ſix inches in diameter, and a fragment of an ivory armilla only a quarter of an inch in thickneſs, that the latter yields animal matter, and the former not the ſmalleſt degree whatever of it; muſt I not juſtly be permitted to draw this inference; that as the earth, within the given time of *thirteen* hundred years has not had the power of petrifying ſo ſmall a ſubſtance as an ivory armilla, or of extracting the animal property from it; that the time which would have elapſed to have rendered the tuſk of an elephant calcarious, and to have converted it into the ſolid ſubſtance of an agate, could not bear any relative proportion to the tranſition of time which human obſervation has thus prefixed: hence, by

PLATE II.

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* Theſe remains I have likewiſe laid before the Society. They were found in a range of barrows of the lower Britons, opened under my inſpection, and the contents in my poſſeſſion; ſituated on Chatham Hill, within the King's works, Anno; 1779.

a progreſſive ſucceſſion of truths, I may naturally conclude, that ſome unknown lapſe of time muſt have tranſpired for the production of this phænomenon, or that the earth muſt have been endued with a power of operating this effect, which ſome revolution in nature has now entirely deſtroyed.

As this expoſition may meet with ſome trifling objection, not being able to aſcertain with that preciſion as is neceſſary on diſcuſſions of this ſerious import to ſcience, whether the chalky ſoil in which the elephant's tuſks were found, was, in reſpect to its conſtituent quality, perfectly analagous to that which contained the ivory armilla, I ſhall therefore ſtate Caſe the 2d. which will eſtabliſh other *data* more ſatisfactory.

CASE II.

In the year 1771, at Kingſton, on Burham Downs, the late Reverend Bryant Fawſſet, of Heppington, near Canterbury, on opening a range of tumuli, diſcovered, among various relics of the fifth century,

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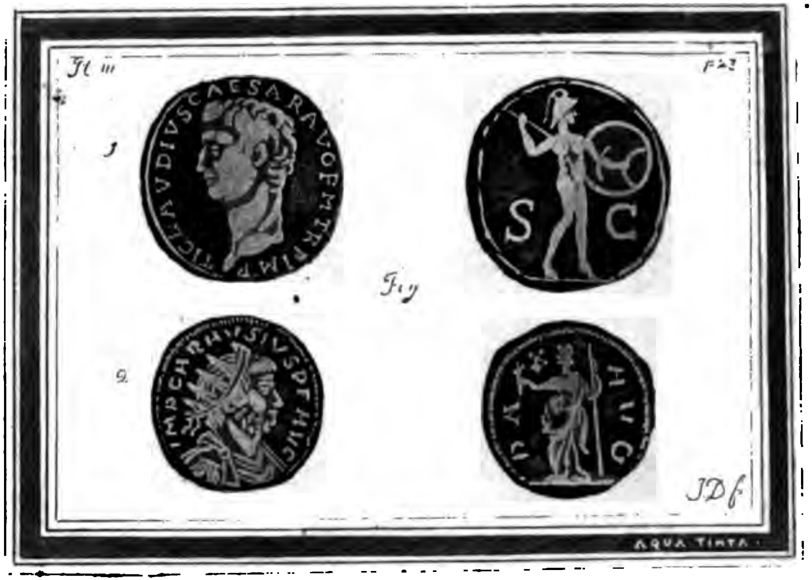
Pl III
P 23
1
TI CLAVDIVS CAESAR AVG P M TR P IMP
S C
Fig
2
IMP C CARAVSIVS P F AVG
PAX AVG
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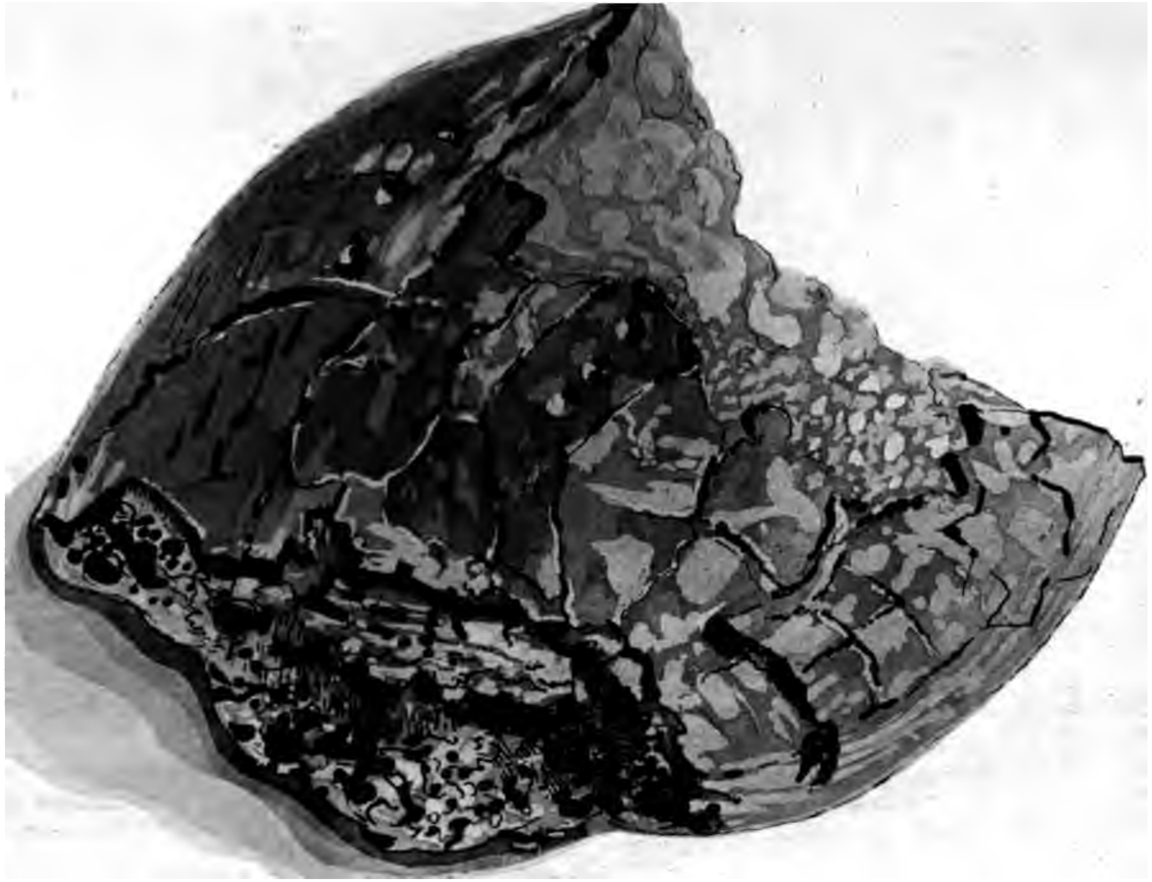
AQUA TINTA

ry, a large Eaſt Indian Cowry (vid. PLATE II. FIG. III.) perforated, with a braſs ring, which the pagan Romans uſed as a ſymbol of the *Deus regenerator*, and otherwiſe as an amulet of Priapus. Two coins were found in this barrow, vid. PLATE III. FIG. I, a Claudius of the 2d. braſs, TI. CLAUDIUS CAESAR, AUG. PMTR. P. IMP. The reverſe, *S. C. Pallas gradiens, dextrâ haſtam, ſiniſtra clypeum ferens.* FIG. II. a Carauſius of the 3d ſize. IMP. CARAUSIUS. P. F. AUG. rev. PAX. AUG. *Fig. Mul. ſtans dextrâ ramum tenet. ſiniſtra haſtam.* The cowry, with three others found in barrows in this country, in the above learned antiquary's collection, was in part reduced to a calx, particularly the portion of it which laid neareſt the body; but the far greater part preſerved the ſubſtance of a recent ſhell, with its poliſh, and the diſcoloured ſpots which they are variouſly tinted with. Thus we have an inſtance of a ſhell that has remained near fourteen hundred years in the earth, without undergoing any very viſible change of great decay, or indeed any change whatever to a ſtate of petrefaction. If we therefore compare

PLATE II.

theſe effects with the chalk *echinus*, the *pectinite* and other marine remains found in the ſame *ſtratum* of chalk; we ſhall then obſerve, by the induration of theſe ſhells, that they have undergone a palpable tranſmutation from their original ſtate, and conſequently, by a parity of argument, we have authority for concluding that an unknown lapſe of time, bearing no proportion with the *data* expreſſed as above, muſt have paſſed, or ſome extraordinary event of matter muſt have taken place, to change theſe bodies from their original properties.

It would make an endleſs digreſſion were I to ſtate a variety of ſimilar effects of marine and animal petrefactions found in the bowels of the earth; the ſtructure and matter of which, could not poſſibly come within the compaſs of human obſervation to fix on a period in which the tranſmutation has been performed; I ſhall therefore briefly ſtate



LD. fect in Aqua Tinta.

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CASE III.

WHICH comprehends an argument founded on a foſſil *tortoiſe*, vid. PLATE IV. and a foſſil *fruit*. The tortoiſe I have alſo exhibited for the inſpection of the Society; the latter is in the poſſeſſion of the learned Preſident, Sir Joſeph Banks. Theſe foſſils are conſiderably the largeſt of their kind that have been diſcovered in this iſland [*]. The *ſhell* of the tortoiſe meaſures ſix inches in breadth, and when entire, was near a foot in lengh; as the animal is obſervable in the ſhell by the thigh bone and other parts, it muſt have been too ponderous to have been floated on our coaſts from the climes which are at this period congenial to its exiſtence; conſequently it ſhould ſeem that it was the inhabitant of the coaſt where it was found in its foſſil ſtate.

PLATE IV.

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[*] THESE foſſils were found in the Iſle of Sheppey; an iſland remarkable for a variety of animal, marine, and vegetable exotic petrefactions. The foſſil fruit, one of the ſubjects of this inquiry, is a ſpecies of the almond, and is remarkable, in the opinion of the moſt intelligent perſons, as bearing no analogy in ſize to any recent ſpecimens of this nut diſcoverable in any quarter of the globe.

THE fruit, which is the exact ſize of the drawing, vid. PLATE V. ſhould alſo ſeem to have been the produce of theſe climes. PLATE V.

IF this foſſil had been depoſited by a reflux of the waters, it might poſſibly have been imbedded with the remains of animals, as is evident in the diſcovery of the tortoiſe, and a variety of other ſpecimens of this nature, which could eaſily be enumerated; but it is not probable that freſh water, as well as ſalt water fiſh, would be found in the ſame ſtratum of ſoil; many ſpecimens of which I have in my collection, particularly the head of a pike; the parts of this fiſh are too deſcriptive to admit of the ſmalleſt doubt of its identity: the under jaw of the pike is more elongated than the upper, and the latter totally deprived of any teeth. Specimens of ſalmon are frequently found in the ſame ſtratum, and various other palpable remains of the freſh water ſquamous tribe *.

THE time allotted in ſacred writ for the retreat of the waters, was *an hundred and fifty days*;

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* Vid. The Sheppey foſſils in Leiceſter Houſe.

I.V. p26

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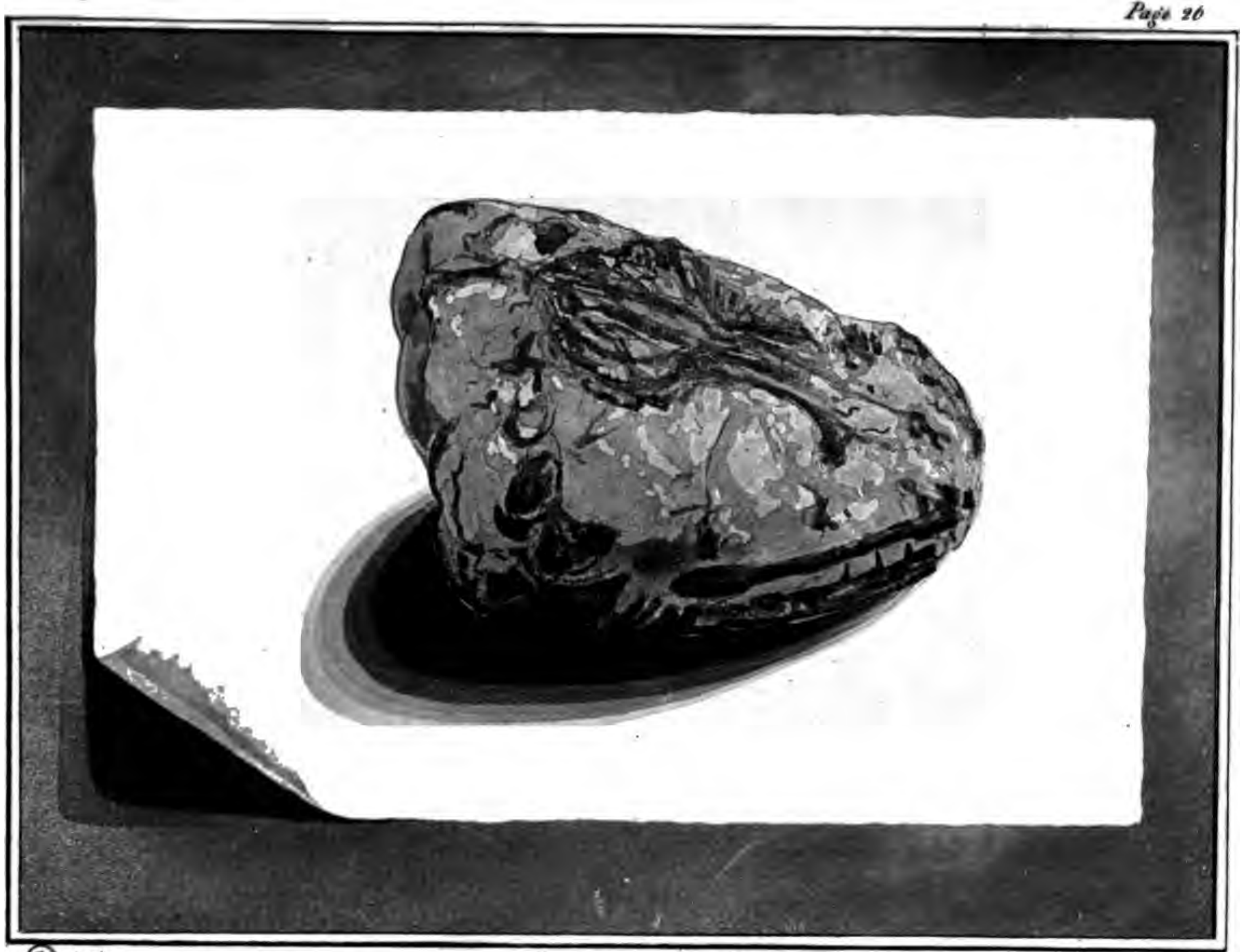

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The Head of a Pike

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and as no convulſion in Nature is deſcribed by Moſes, which might have cauſed theſe fluvial remains to have been diſcharged from their native regions in poſitions ſo apparently unnatural, and placed with other bodies, perfectly heterogeneous in their nature, the produce of the land, we are undoubtedly authorized to believe, that with the reflux of the waters, ſo moſt of its inhabitants had alſo retreated. The VII. and VIII. CHAP. of Geneſis, which treat of the deluge, only ſpeak of the living creatures of the earth ; but no mention is made whatever of the inhabitants of the deep.

CHAP. VII. VERSE 22. *All in whoſe noſtrils was the breath of life, of all that was in the dry land died.*

VERSE 23. *And every living ſubſtance was deſtroyed which was upon the face of the ground, both man and cattle, and the creeping things, and the fowls of the heaven ; and they were deſtroyed from the earth : and Noah only remained alive, and they that were with him in the ark.*

THUS

Thus we are permitted to infer from theſe ſacred aſſertions, that other cauſes muſt have tranſpired to have operated effects of a nature ſo eſſentially diſſimilar. The bed in which theſe remains are found, ſhew them to be of an antideluvian period*; a period beyond the records of man, and attended with ſuch circumſtances, that we might not unreaſonably conceive ſome calamitous event had poſſibly deſtroyed all animal life † from the face of the earth, and conſigned to oblivion a cauſe, the record of which muſt otherwiſe have been tranſmitted from poſterity to poſterity, to the very end of time.

Though the Scripture ſays, *All the fountains of the great deep were broken up*, an expreſſion which

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[*] Vid. the Appendix to this Diſſertation.

[†] When men of inquiry conſider this remark with every neceſſary retroſpect, and who have had opportunities of turning their thoughts to the practical ſtudy of theſe foſſil phænomena, I do not heſitate to ſay, that they will have a conſtant ſupply of examples to incline them to adopt a firm belief, that this earth has undergone a commotion, abſtracted from the deluge alone, which might have deſtroyed its inhabitants, if not totally, perhaps partially ſo, on the ſpot where ſuch a commotion took place.

would imply a convulſion of ſome extraordinary nature ; yet we have, I again repeat it, no authority to conclude, that this convulſion was in its effects equal to thoſe which have produced the foſſil phænomena that are found in the bowels of the earth, in all quarters of the globe. This doubtleſs would have procured effects ſimilar to thoſe which are found under circumſtances deſcriptive of ſimilar commotions, ſuch as the ſtrata of foſſil bones found on the coaſts of Iſtria, Dalmatia, in the iſlands of Cherſo and Oſero*, in the iſland of Cyprus, in moſt of the PLATE VI iſlands of the Ægean ſea, and the rock of Gibraltar†, which imply the moſt convincing proof of an alluvion

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* Vid. PLATE VI. which I have here prefixed to give an idea of the ſituation of theſe iſlands, to be referred to in this argument, and which perfectly agrees with the deſcription of the Abbé Fortis, p. 361, to p. 429.

† As theſe bones have improperly been aſcribed to the effects of the Samothracian deluge recorded by Diodorus Siculus, I have thought proper to tranſcribe the paſſage from the above author, and to offer my remarks upon it, for the conſideration of thoſe who have made this intereſting part of foſſilogy their ſtudy

Οἱ δὲ Σαμοθρᾶκες ἱστοροῦσι πρὸ τῶν παροὶ τοῖς ἄλλοις γενομένων καταχλυσμῶν ἕτερον ἐκεῖ μέγαν γενέσθαι, τὸ μεν πρῶτον, τοῦ περὶ τας Κυανέας στόματος ῥαγέντος, vion by the diſlocation and fractures of the bones, and here and there ſmall ſpecimens of ſhell fiſh imboſſed

μετὰ δὲ ταῦτα, τȣ̃ Ελλησπόντȣ. τὸ γαρ̀ ἐν τῶ Ποντω πελαγος λιμνης ἐχον ταξιν, μέχρι τοσοῦτου πεπληρῶσθαὶ διὰ τῶν εἰσρεόντων ποταμῶν, μεχρις ὅτου διὰ τὸ πλῆθος παρεκχυθὲν τὸ ῥεῦμα λάβρως ἐξέπεσεν εἰς τὸν Ελλησπὸντον, ϗ πολλὴν μὲν τῆς Ασῖας τῆς παρὰ ταλατῖαν ἐπέκλυσεν, οὐκ ὀλιγην δὲ ϗ τῆς ἐπιπὲδου γῆς εν τῆ Σαμοθρακη θὰλασσαν ἐποίησε Καὶ διὰ τοῦτο ἐν τοῖς μεταγενεστέροις καιροὶς ἐνίους τῶν ἀλὶεων ἀνεσπακεναι τοῖς δικτὺοις λιθινα κιονοκρανα, ὧς ϗ πόλεων καταχεκλυσμένων. Τοὺς δὲ περιλειφθεντας προσαναδραμεῖν εἰς τοὺς ὑψηλοτέρους τῆς νησου τοπους. τῆς δὲ θαλὰσσης αναβαινούσης αεὶ μᾶλλον εὔξασθαι τôις Θεοῖς τοὺς ἐγχωριους, ϗ διασωθέντας κυκλω περὶ ὅλην τὴν νῆσον ὅρους θέσθαι τῆς σωτηρὶας ϗ βωμοὺς ἱδρυσασθαι, ἐφ' ὧν μεχρι τοῦ νῦν θύνιν. Diod. Vol. I. Sec. 253, lib. v. p. 369. *Pet. Weſſel.*

" THE Samothracian hiſtorians aſſert, that before the floods
" recorded of other nations, a very great one happened in their
" country; this deluge was produced by the eruption of the wa-
" ters, which at firſt broke through the Cyanean rocks, and after-
" wards ruſhed into the Helleſpont. The Euxine ſea, formerly a
' great lake, was then ſo much ſwelled by the waters which
" entered it, that not being capacious enough to contain them,
" they overflowed into the Helleſpont, where they ſubmerged
" a great part of the maritime Aſia, and alſo overwhelmed great
" diſtricts of Samothracea. In confirmation of this, fiſhermen
" in latter times have dragged up ſtone capitals of pillars in their
" nets, which prove that the ſea covered the ruins of their an-
" cient towns. It is reported that the inhabitants who eſcaped
fled to the more elevated lands, but the ſea ſtill increaſing,
" they

boſſed in the maſs ; whereas all the large ſpoils of marine animals are never found with them : an atteſted

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" they invoked the Gods, and thereby being delivered from their
" perilous ſituation, they encompaſſed the places where they
" were preſerved throughout the whole iſland, and there raiſed
" altars, where they perform ſacrifices to this day to their Gods."

Though the Illyric foſſil bones have been originally depoſited by a flood, on their reſpective coaſts, it is alſo evident the original ſtratum in which they were incloſed, has undergone a conſiderable change; obſervable by their confinement in a lapideous ochreo-ſtalactic earth, alternately compoſed of marble ſplinters and bones; theſe ſplinters of marble are of an angular ſhape, and conſequently have never undergone any trituration by the waters. According to the very critical and modeſt account of the Abbé Fortis, theſe ſtrata are found interrupted in large inſulated maſſes diſperſed among the mountains, of a very different ſubſtance from thoſe that ſurround them, which prove the exiſtence of ſtrata, that have been fractured by ſome convulſion in a remote period of time. The depoſit of theſe bones under the baſis, or in the hearts of hills, vid. PLATE VI. thoſe in particular which pervade the rock of Gibraltar at the height of one and twenty feet only from the level of the ſea, meaſured by Lieut. Col. Davies, of the Artillery, anno 1784, at the ebb of the tide, which in the Mediterranean does not exceed four feet; their compacted nature, and in particular their phyſical conſtituent quality, which ſhow them to have been ſo indurated by a power different from the ordinary accretion produced by ſparry or ſtalactical induration, evince that the alluvion, which had originally floated that immenſe, that wonderful congeries of animal bones,

PLATE VI.

teſted evidence, that with the retreat of the waters, ſo the fiſhes receded into the boſom of lakes, rivers, or oceans.

WATER

bones, was much anterior to the Samothracian deluge mentioned by Diodorus, or that of the Fgyptian prieſts, which learned men have had occaſion to mention on the ſubject of theſe bones.

THE Samothracians, in the time of Auguſtus, may have ſhewn the altars that were erected over their iſland, where the waters had reached, and where their anceſtors had retreated; and though they are doubtleſs monuments that an irruption of the waters had actually happened in thoſe parts, yet they are alſo memorials, that the foſſil bones, from the above argument, were not the wreck of that deluge.

PLINY ſays, Lib. ii. Cap. lxxxvii. "Claræ jampridem inſulæ, Delos et Rhodos, memoriæ produntur enatæ. Poſteà minores, ultra Melon Anaphe, inter Lemnum et Helleſpontum, Nea: inter Lebedum et Teon, Alone: inter Cycladas Olympiadis cxxxv anno quarto, Thera et Theraſia. Inter eaſdem poſt annos cxxx. Hiera ædemque Automate. Et ab duobus ſtadiis poſt annos cx. in noſtro ævo, M. Junio Syllano, L. Balbo coſs. ad viii. Idus Julias Thia." As the formation of theſe iſlands are here correctly accounted for by the expreſſion of the word *enatæ*, we are not at liberty to ſuppoſe they were cauſed by any irruption of the waters which might have ſubmerged the lower countries; and particularly, the origin of the iſland of Thia ſeems here ſo well atteſted, that we have no reaſon to doubt the reality of Pliny's account; conſequently if in Delos and Rhodes theſe foſſil bones are found, and in the other iſlands deſcribed by Pliny, we are au-

thoriſed

Water and fire uniting, would certainly produce the moſt extraordinary diſorder on the face of the earth; and by disjointing lands over which rivers had flowed, and ſubtending by the rarefaction

thoriſed to ſuppoſe that they muſt have pre-exiſted the period of the Samothracian deluge: let us alſo ſtate that they have been found in the iſland of Cyprus, and then this old hiſtorian will again be uſeful to our argument. Avellit Siciliam Italiæ, Cyprium Syriæ—Lib. ii. cap. lxxxviii. Theſe iſlands were disjoined by floods from the main land, by an ancient flood which he aſcribes to nature, the ſame being older than the records of his time: therefore theſe bones being imbedded in the heart of theſe iſlands, which otherwiſe if depoſited by the Samothracian deluge, would be found only on the neighbouring parts of the ſhore, we muſt ſtill repeat that they were not the effects of that deluge.

The beſt informed of our natural philoſophers agree, that moſt of our petrefactions are performed under the ſea; and as the Abbè Fortis, vid. p. 448 of his work, gives good authority for ſuppoſing, that theſe ſtrata of foſſil bones extend from the northern ſhore of the Quarnaro to the iſlands of the Ægean ſea, in which theſe iſlands recorded by Pliny are ſituated; that they have alſo from good report, been found in the iſland of Cyprus; and doubtleſs the ſame ſtrata of bones in the rock of Gibraltar: ſo we may, admitting the moſt ſcrupulous caution, infer that they have been indurated in their ochreous and ſtallactacious bed by a ſubmarine power, cauſed by the united action of water and a ſubterraneous fire, prior to the ſubtenſion of theſe iſlands, produced by the expanding nature of two ſuch powerful agents; which operation will naturally corroborate the teſtimony of Pliny, vid. lib.

faction of ſteam, the cauſe of earthquakes, great tracts of earth, over which, by a ſucceſſion of ſimi-
lar

lib. ii. chap. lxxxviii. Ante nos et juxta Italiam inter Æolias inſulas, item juxta Cretam emerſit è mari, M. D. paſſuum, una cum calidis fontibus—

When natural philoſophers conſider with an attentive eye theſe apparent phænomena, they will have no cauſe to doubt the various tranſmutations of land, by the eruptions and recedence of waters, perhaps alone produced by the aforeſaid powerful effects of ſubterraneous fire; and, as in the inſtance of theſe Illyric bones, that doubtleſs were once depoſited by ſome very remote alluvion, and in ſubſequent ages conſolidated by a natural chemical operation of mineral acids united with fire and water, ſo we ſhould have the cleareſt evidence to pronounce, that they had been ſubtended from their natural beds, and diſplayed to us under the local forms which the above careful traveller, the Abbé Fortis, has ſo critically tranſmitted to the world.

That floods, ſubſequent to the univerſal deluge, have prevailed more frequently in remote antiquity, than in latter times; and as ſome have tranſpired under the obſervation of hiſtorians that have recorded them, we can have no doubt from the good teſtimony of Pliny, who alſo from apparent well atteſted tradition, and the accounts of his cotemporaries, aſſigns a ſtrong reaſon for the cauſe of the convulſions which have diſordered or changed the face of the globe, vid. lib. ii. from cap. lxxxiii. to xcv, which treat of earthquakes, fiery eruptions, depreſſions and ſubtenſions of countries, the diſlocations of mountains, and various floods; and what can be ſtronger than the
expreſſion

lar events, the waters may have flowed, and again receded by the like cauſes; ſo various heterogeneous bodies of animals, fiſh, and vegetables, may have been

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expreſſion of the Scriptures, *All the fountains of the great deep were broken up*, to prove that ſubterraneous fire muſt have been the cauſe of ſuch powerful and general commotions?

Strabo confirms the account of Diodorus Siculus, of the Samothracian flood, lib. i. p. 85, in ſo clear a manner, that no doubt can ariſe againſt the fact. *Philo de mundo non Corrump.* p. 959. aſſerts, tho' againſt the clear evidence of Pliny, that the iſlands of Delos and Rhodes were produced by this deluge, and indeed ſhould it even ſeem that all the iſlands of the Ægean ſea had been produced by this cauſe, we ſhall ſtill acquire ſuch a demonſtration of evidence from the ſtrata of bones which penetrate theſe iſlands at ſuch altitudes, and with ſuch maſſes of earth over them, as could never proceed from their having been depoſited at that period, and from that deluge, vid. PLATE VI. which will ſhow the vaſt PLATE VI. bulk of matter which may poſſibly cover the bones in various places in the iſlands. I am therefore inclined from this coincidence of facts, to aſcribe moſt of our foſſil phænomena to both theſe cauſes united, and not from water only; and which may properly be called the ΨΥΚΗ ΤΟΥ ΚΟΣΜΟΥ or Plato's Soul of the World.

We find in Herod. lib. iv. that Veſta was adored by the Scythians, the moſt ancient of the human race, as the ſymbol of fire, which they conceived had once embraced the whole univerſe, and by other ancient nations under various forms. *Ignis qui et mundum* been profoundly imbedded in the earth; but in this caſe, the produce of reſpective climes muſt be found approximate to the ſpot where the convulſion happened: thus, from a concluſion of this obvious nature, the *foſſil nut* could not have been depoſited in the ſtratum from whence it was taken, by the effects of an alluvion only, but by other cauſes as diſtinct as apparently diſſimilar in their effects.

ARGUMENTS are frequently produced to aſſign a cauſe for the diſcoveries of foſſils, which have no analogy

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mundum genuit cuncta poſſedit. Juſt. *lib.* i. *cap.* 1.; and on the other hand they ſuppoſed that a flood or floods had univerſally prevailed. *Idem ſive illuvies aquarum principio rerum terras obrutas tenuit.* The hiſtory of the Egyptian Canopus is alſo an atteſtation that fire and water were the two powerful agents which had cauſed a wonderful diſorder in the univerſe; and this was the ſource of a great diſpute between the Egyptian and Chaldean prieſts in a conteſt for a ſuperior power to be given to one or the other of theſe in their mythology. Was this ſubject to be enlarged upon, it is eaſy to obſerve how ſtrong arguments might be produced, that fire has been the original cauſe of remote inundations, and that the convulſions of the earth, together with the conſiſtency of its component matter; the production of its metals, minerals, and moſt of its foſſil productions; muſt have originated from the united action of theſe cauſes. Theſe few proofs may perhaps be ſufficient to confirm what many analogy with any recent ſpecies of this iſland. It has been obſerved that many North American fruits have been found on the weſtern coaſts of Ireland, evidently floated there by the winds and tides; this fact I know is well eſtabliſhed. Hence it has been inferred that many exotic remains may be found foſſil in this iſland; an argument ſo purile that I am ſure it will not be expect-

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many enlightened minds have long conjectured, but have been obliged to forego for the want of ſuch proofs. If they can tend in the ſmalleſt degree, by making men wiſer, to make them happier, it is ſurely a glorious reward for the little trouble which has been taken to promulgate theſe thoughts to the public; ſuch a thought is of itſelf an apology for any author to intrude his work; and in ſpite of that vanity which the cold miſanthrope may fancy to be attached to all human prdouctions, a vanity which human nature has great cauſe to rejoice in, we ſhould be proud to ſay, that as happineſs is the meditation of our worldly purſuits, ſo no man can be truly happy unleſs he is in ſome reſpects wiſe; that is, unleſs he is ſufficiently inſtructed in human knowledge to know when to place a barrier to his inquiries, and conſequently a regulation for his conduct. In metaphyſical or philoſophical ſtudies it is therefore neceſſary, as in the actions of our lives, to know when to limit our reſearches; it will be the only method of ſhowing our feeble depending exiſtence on a ſupreme power, and of circumbſcribing the human mind in thoſe inquiries which inſenſibly lead it to ſcepticiſm and impiety. No explanation is I hope wanting for the application of this remark.

ed that I ſhould offer a reaſon againſt it; however I ſhall produce one, briefly to alledge, that no comparison of this nature can be oppoſed to the reſult of the diſcovery of the *nut* in the iſle of Sheppy; ſeeing that it was found in a vaſt ſtratum of earth, with the remains of terreſtrial and marine animals; a ſtratum of earth, which could not have accumulated alone by the reſidue of the waters in any given time, but muſt have been ſo ſubtended by a convulſion of the globe produced by other cauſes. The fibrous parts of the nut are converted to a ſtone, and in its conſtituent quality, it will be found of a nature that muſt have proceeded from a cauſe indiſtinct from that ſimply ariſing from the age of its depoſit, or the common-received laws of petrifaction. On a cloſe ſurvey it will be found to have been indurated by a ſimiliar power which operated on the remains of the Hippopotamus, and which power muſt be referable to a cauſe which in its natural proceſs perhaps no longer exiſts.

An acid menſtruum has been lately diſcovered, which will diſſolve the hardeſt bodies; and it is well known that the decompoſition of fluor ſpar, united

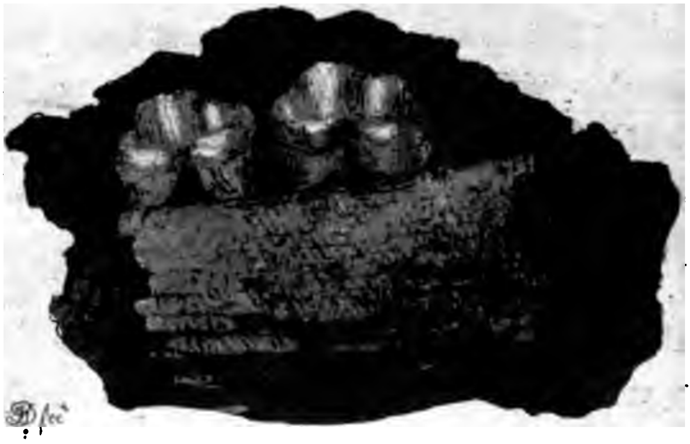
united with the vitriolic acid, gently fermented with the aſſiſtance of fire, will, in paſſing through water, cryſtalize, and probably indurate animal bodies oppoſed to it. But where is this chymical effect now operating by natural cauſes in the earth? If exiſting at this period, it muſt be in the deep maſs of the earth, beneath the ocean, or profoundly ſituated in the neighbourhood of volcanoes, impervious to any human obſervation.

If we therefore confront the depoſit of theſe foſſil bodies with thoſe of the Hippopotamus, the remains of which have been found in ſuch local circumſtances, ſo fitly correſponding with the actual exiſtence of the animal in theſe parts, I preſume ſuch facts will tend to eſtabliſh the certain data for the argument of this paper; *That the regions where theſe animal remains have been found, were at a certain period of time, under a ſuperior influence of warmth than they are at this æra: to ſhew reaſon why theſe bodies could not have been removed by an alluvion of forty days from their native climes at a diſtance ſo remote, and to have been depoſited under circumſtances ſo clearly oppoſite to the effects*

of

of ſuch a cauſe: and that the earth has had a power of tranſmuting bodies into ſolid and homogeneous ſubſtances, at a period beyond the date of written teſtimony; or which power, if now exiſting is, by ſome extraordinary convulſion of matter, remotely concealed from human obſervation, within the bowels of the globe.

As all men are prone more or leſs to metaphyſical enquiry, it is more dangerous for the cauſe of religion to have the untutored mind puzzled, than to ſet it right in matters that will bear explanation; hence it is well known that men, when they fancy they have diſcovered any apparent inconſiſtency in the ſcriptures, will not reſt ſatisfied with the exact letter before them: wherefore it has been often ſtarted as a matter, which requires great reconciliation, that the ſun being created on the fourth day, the preceding days could not be computed by ſolar calculation; many well-informed perſons have therefore been inclined to ſuppoſe that the earth was created in ſix expanſes of time, inſtead of ſix days; and with theſe ſentiments they have not been at a loſs to account for all our natural phænomena: theſe arguments have been likewiſe ſtated to prove, that Moſes, when he addreſſed himſelf to the children of Iſrael to ſatisfy the vulgar mind on the nature of the creation, framed his diſcourſe in figures and terms beſt adapted to their ſimple and untutored ſtate; and that admitting familiar incident to phyſical diſquiſition, he adopted the ſolar day inſtead of an expanſe of time, which the vulgar mind could not ſo readily comprehend; and thus, inſtead of explaining a complicated ſyſtem of phyſical argument to an unlettered multitude, into whom this great inſpired lawgiver was deſirous of inſtilling an awful reſpect for creation, and above all, religious ſentiments for the great obligations due to a ſupreme inviſible power; he was therefore inſtructed by the Almighty to make uſe of a familiar vehicle for the purpoſe; a ſyſtem of nature, which all minds could conceive, and which was equally juſt with the more profound, though exemplary ſcience. If we therefore reſpect the hiſtory of the world, according to the Moſaical doctrine in its ordinary ſignificance, or by its more complicated import, the religious and well-regulated mind, will have the ſame cauſe for venerating the great plaſtic hand of the deity, to whom the creation of matter was in every ſenſe equally efficacious, and to whom time, whether minute, day, or æra, was of no account; the power of the Almighty would be ſtill manifeſt, and fully as important, as we find it to be recorded in the firſt book of Geneſis.



APPENDIX.

THE above PLATE repreſents the under jaw of a quadruped, found, with various other fragments of animal bones, in the rock of Gibraltar, brought over by Lieutenant Colonel Davies, of the artillery. This jaw, in the opinion of Mr. John Hunter, whoſe ſkill in comparative anatomy is ſufficiently eſtabliſhed to render his opinion of conſequence, is the remains of an animal no longer known. The ſpecies ſeems to have been extinct; the cauſe apparently derived from that revolution of the earth, which univerſally prevailed at the remote period of time, which I have more fully enlarged upon in the preceding diſcourſe.

LIKE that of the Hippopotamus, it is deprived of its animal matter, and indurated in an ochreous and ſtalactic bed, peculiar to the remains of the animal bones found in the iſlands of the Egean ſea: various angular ſplinters of marble are alſo found in the ſame congeries; the bone of the jaw is rendered calcarious throughout, nor do theſe bones in general ſeem to be permeated with a lapideſcent matter, though in their interſtices the ochreous depoſit is ſometimes very firmly indurated; and in their cavities, particularly of the fiſtular bones, ſparry accretions are formed by the filtration of this matter through the fine texture of bone, when in its calcarious ſtate. The teeth are of as fine a poliſh as agate; their ſtructure indicate that the animal was of a carnivorous and graminivorous nature; in all graminivorous animals, the enamel pervades the

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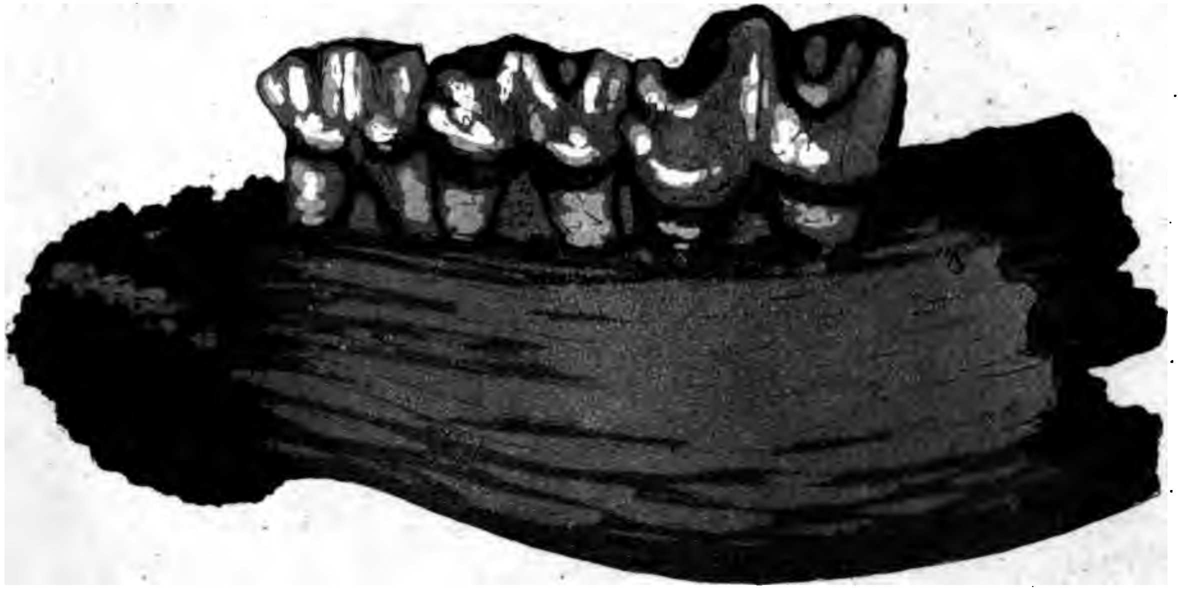

Foſsil **ANIMAL INCOGNITUM** *bone from* ***THAME.***

tooth in laminæ, to hinder the tooth from wearing by the frequent uſe of maſtication of hard ſubſtances: this tooth, as is apparent on the ſurface, has no enamel in the centre, but the hollow is filled up with the ochreous matter. When I firſt ſaw this jaw in the poſſeſſion of Lieutenant Colonel Davies, I conceived it to be ſimilar to one in the Muſeum of Sir Aſhton Lever, No. 20, which was found under ground by digging a well at Thame, in Oxfordſhire; the length is about ſeven inches; four inches in breadth to the top of the largeſt tooth, and three inches to the ſmalleſt; the largeſt tooth is about one and a fourth of an inch, protruding from the jaw. In both, the ſymphyſis, where the jaw united, and in which the fore-teeth were placed, is very evident; the only difference in the ſpecimens is in ſize; the one found at Thame is larger; a common difference in the ſame ſpecies of animals; it is broken off at the third grinder; the one from Gibraltar is broken off cloſe to the ſecond grinder, as deſcribed in the plate.

From the appearance of the jaw, found at Thame, I ſhould think it contained the animal phlogiſton: the caſes being ſealed up at Leiceſter Houſe, I had no opportunity to make any trial upon it; but were this even the caſe, it does not follow that the bone is leſs ancient. I have tried fragments of the ſpecimens of the large animal incognitum found on the banks of the Ohio and Miſſiſſippi rivers, and have found them to contain almoſt as much animal matter as a Smithfield bone. The young Doctor Michaelis, phyſician to the Heſſian troops, when he was here, and who took great pains in his inquiries on the ſpot when in America, concerning this ſurpriſing animal, found this to be the caſe. But foſſil bones, it ſhould be obſerved, do not acquire in all ſoils equal induration; nor ſhould it in the leaſt degree militate againſt my argument, becauſe bones may be found in one ſoil petrified, in another in a friable ſtate, or laſtly, preſerved with animal matter in them. Deductions from their component qualities can only be made, when two ſimilar bones are found in ſimilar ſoils in diſſimilar ſtates of preſervation.

Hence from this teſtimony, ſubjoined to the others which have been here ſpecified, I ſhould conclude theſe bones to have belonged to an antediluvian world; to have been the remains of animals, pre-exiſting any floods that tradition has tranſmitted to us; the remains of animals, that ſome fatal revolution of the globe had, by the deſtruction of a vaſt multitude of the brute, and *perhaps* human ſpecies, finally obliterated.

I HAVE obſerved in the notes to my Diſſertation, that the angular fragments of marble found in the ſtrata of bones on the Dalmatian coaſt, and in the rock of Gibraltar, indicate, that they had undergone no trituration by water, when that convulſion happened which united them in one congeries, but which indicate that the ſtratum of bones had been formed previouſly to that commotion, and depoſited on that coaſt by a flood. Since this remark was printed, I have been fortunate enough to bring proof, that theſe diſſimilar commotions of waters ſeem to have exiſted *perhaps* all over the earth. This evidence is ſo curious, yet ſo true in its nature, that I cannot find a better place to record it in than here.

I HAVE the ſpecimen of a flint, originally formed in a chalk bed, which I found in a ſtratum of fine ſea ſand, blended with ſmall triturated fragments

fragments of chalk, flints, and gravel, on the ſide of the London road, which deſcends into the town of Stroud, near Rocheſter. The flint has a fair impreſſion of a middling ſize pectinite on its ſurface; it has been fractured, and its angular parts, have evidently been rounded by the waters; this is particularly obſervable on the ſhell, which has its converging indented lines worn down on the part where it has been ſo chafed. The ſhell fully demonſtrates that the component parts of the flint muſt have been in a fluid vehicle, to have been received into its maſs, and originally in a different bed to its recent one, which the moſt unſkilful eye can perceive is not of made earth. The firſt layer is of pebble and ſand; the ſmall rounded fragments of chalk are in layers interſperſed with gravel, fine ſand, and flint ſtone, under which is a natural rock of chalk: each ſtratum in an horizontal level, ſo framed by the depoſit of the waters.

THE flint, with the impreſſion of the ſhell, as I before obſerved, was found in the ſtratum of rounded chalk, gravel, fine ſand, and flint; inconteſtably aſſerting, that a remote marine depoſit had been originally formed, when the flint was encloſed

cloſed in its native bed, ſubſequent to which a revolution of the waters had prevailed on thoſe heights in which the flint was found, now conſiderably above the level of the river Medway; that this revolution muſt have been accompanied with a violent commotion, to have diſlocated the ſtratum of chalk in which the flint was originally produced, and to have brought with it the heterogeneous bodies which form the different ſtrata. It ſhould alſo ſeem by the rounding of the aſperities, of the fractured parts of the flint*, that the waters had prevailed no inconſiderable time on thoſe heights.

It is from the aſſemblage of theſe facts, in theſe ſtudies, that all true knowledge can be acquired, and fixed principles received: when they are advanced with caution, and with a ſcrupulous care, they are of the greateſt importance to the hiſtory of thoſe revolutions under which all nature, at different periods of creation has univerſally been ſubject to, from the wonderful and united power of *Fire* and *Water*.

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* The pebbles that are found on the ſea coaſts, and in many, beds of the earth, do not receive their forms by attrition only, but have been ſo rounded in their original ſtructure, in the beds of matter from which the waters or other revolutions of the earth have at ſome diſtant period ſeparated them. They have moſtly like ſome flints been originally created in nodular forms; attrition by water may perhaps have injured their ſurface, but they certainly do not owe their recent forms to this latter cauſe. This inquiry, as may be ſeen at firſt ſight, would admit of an elaborate treatiſe to explain it in a ſatisfactory manner.

REMARKS

ON

M. LE COMTE DE BUFFON's SYSTEM.

HAVING ſaid ſo much on the ſubject of the apparent phenomena found in the bowels of the earth, and the argument naturally riſing to a more extenſive diſquiſition; and as the minds of men are conſequently ſtill ſoaring to a more elevated inquiry into the hiſtory of the world, I ſhall therefore briefly animadvert to one or more of our modern writers on the ſubject, whoſe names are known,

known, and whoſe arguments are variouſly received, according to the knowledge, labour and ſkill of ſome patient and rational beings, or the idle and ſuperficial conceptions of others. My only view is, to render the ſubject no longer a matter of diſpute, and by concentring the truths of other writers to my own obſervations, to eſtabliſh a principle as a foundation for more uſeful inquiries; and to regulate the minds of ingenious men on a ſubject of this momentous nature, by which their religious, moral, and ſcientific conduct may be turned to a proper bias ; to their own and the public happineſs.

M. le Comte de Buffon, in his Supplement to his Natural Hiſtory, has concentred a prodigious collection of materials, to eſtabliſh a very ingenious argument; his inquiries are profound, and his deductions from natural facts ſeem to be juſtified by many cotemporary and approved principles ; how far his juſtification may be true or falſe, I ſhall not in this place take upon me fully to inveſtigate ; as his labours have been great, and his principles in many inſtances have reflected the greateſt honour on the ſtudy of Natural Hiſtory, I ſhall always ſpeak of him with reſpect; and particularly in this laſt work, I am ſure that impartial men, who read him with attention, and have previouſly ſtudied ſome heads of the matter which he treats of, will join with me in rendering due homage to his abilities and to the ſervice which he has been of, in repelling the ſtubborn principles of ignorance and fanaticiſm.

THIS learned and ingenious writer has eſtabliſhed his epochs of nature on the following principle of Sir Iſaac Newton: That the equatorial exceeds the polar diameter of the earth in the ratio of 230 to 229; conſequently the earth muſt be in the form of an oblate ſpheroid; invariably a natural property of all bodies, in a ſtate of liquefaction, having a rotary motion round their axes. He then conſiders whether the earth was in a ſtate of liquefaction by water or by fire, and produces various reaſons to ſhew that its primordial conſtituent fluid matter was of a vitrified nature*: that the earth, in a certain given time had received a ſufficient ſtate of temperature to admit the waters upon it, which till that epoch had been ſuſpended over it by the immenſe power of its incaleſcency. Hence from the ſcoria of the globe, fractured and variouſly diſlocated by the contact of two ſuch powerful agents, *Fire* and *Water*, a matter was formed or depoſited on its ſurface, in which the plaſtic power of the deity operated, and animal and vegetable life in a ſucceſſion of time were variouſly modified and produced: by this doctrine he accounts for the depoſit of foſſil bodies all over the globe, and reconciles all other apparent terreſtrial phænomena to this event.

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* *Toutes les matières du globe ſont de la nature du verre.* Vol. I. page 16, Octavo edition. This general truth, which may be

demonſtrated experimentally, was conceived by Leibnitz, the great German philoſopher. Sanè pleriſque creditum et a ſacris etiam ſcriptoribus inſinuatum eſt, conditos in abdito telluris ignis theſauros; adjuvant vultus, nam omnis ex fuſione *Scoriæ vitri* eſt *Genus.* Talem vero eſſe globi noſtri ſuperficiem (neque enim ultra penetrare nobis datum) reapſe experimur, omnes enim terra et lapides igne vitrum reddunt; nobis ſatis eſt admoto igne omnia terreſtria in *vitro finiri*, &c. G. G. Leibnitz, protogeia, p. 4. *Toutes les matières terreſtres ont le verre pour baſe, et peuvent être rèduites en verre par le moyen du feu*, Tome I, page 17. M. de Buffon ſays, there is matter which common furnaces cannot reduce to glaſs, but with a good lens the ſame can be operated.

I SHALL

I SHALL now beg leave to offer my remarks on this curious argument. Since Burnet, Whiſton, and Woodward, the moſt intelligent of our natural philoſophers have admitted in part, a ſubterraneous fire, but I only know of one, Mr. Whitehurſt, who has, beſides M. le Comte de Buffon, proved the ſame to have been general; when I ſpeak of fire I do not infer an heat with which the earth has been indued to produce an increment to all its inhabitants; but an univerſal fire that prevailed at a remote period of time, and which has occaſioned the preſent diſorder which is now obvious on the face of it.

IF the globe, in its original ſtate had been in a vitrified ſtate of fuſion, the waters 'tis true, when received upon it may have entered the caverns produced by its condenſation, and by the reciprocal power of heat and water, the moſt tremendous convulſions may have originated; but in this caſe the profound depoſit of calcareous matter*, replete with marine *exuviæ* could not be accounted for, over which ſtrata of heterogeneous depoſits are frequently found ſhattered and diſplaced at great diſtances from their original poſition.

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* See Mr. Whitehurſt in his inquiry.

Admitting a ſtate of fuſion to the globe, and its fitneſs of temperature to receive animal life; by a powerful concuſſion, the waters may have receded from their primitive beds, and have left their produce on their reſpective lands; but thoſe depoſits would not have been indurated to the ſurpriſing power which we now find them, by the laws of affinity, impelled by attractive powers only, but by the power of that ſubterraneous heat which I have contended for in my foregoing diſſertation; and admitting this, then that power which would be neceſſary for the induration of theſe bodies, their coheſion, by affinity and repulſion by diſſimilarity, would have been incongenial to the vivication of animal ſpecies; conſequently this power muſt have exiſted poſterior to the depoſit of marine and terreſtrial productions. I did not mean in this place to mention Mr. Whitehurſt's name, as it comes in rather immethodically; but ſo natural do his arguments concur with my ſentiments, that I am happy to pronounce his teſtimony as the fitteſt for my purpoſe. " Shell fiſh, ſays he, are found

" at the depth of many hundred yards, embodied in " the ſolid ſubſtance of the lime-ſtone ſtrata, through " their whole thickneſs; as may be obſerved in " all the cliffs, and in the deepeſt mines in Der- " byſhire;" and above this ſtratum, in another place of his work, he obſerves that *the baſſalt*, toad-ſtone, or lava, a volcanic erupted matter, is found in the perpendicular fiſſures of the mines; and this again covered with other heterogeneous horizontal laminæ; the undoubted teſtimony of the exiſtence of fire ſubſequent to the calcareous depoſit in queſtion, and which perfectly correſponds with my argument. It is alledged by M. le Comte de Buffon, that volcanos have erupted poſterior to the reception of the waters on the globe; this is certainly admitted, but it cannot eſtabliſh a ſucceſſion of epochs in the creation of matter; that the waters being received on the earth when congenial for the increment of animal life; ſo, by a ſucceſſion of convulſive events, the waters have receded from the continents, and other continents have in their turn become the beds of the waters: this argument defeats itſelf, and in juſtification of the Moſaical account of the deluge, which the Comte has moſt reſpectfully ſhielded from any vulgar miſrepreſentation, we may reconcile that alarming convulſion of matter which changed the whole face of the earth. Here Mr. Whitehurſt aſſerts, his great practical knowledge, above moſt writers, who may not have had ſuch ſingular advantage; great good underſtanding, and great opportunities for ſuch obſervations.

M. le Comte de Buffon ſuppoſes the lenticular ſtones called Belemnites, and various other ſea productions, particularly the Amonian univalvular ſhells, to the weight of one hundred pounds, and large animals of ſeveral ſpecies found in regions no longer congenial to their exiſtence, were produced, at a period, when the earth and waters were in a warmer ſtate of temperature to have admitted of their increaſe: I do not diſſent from his opinion in this, but I argue, that no regular ſeries of events can be tranſmitted to us, to prove that this tranſition of animal life, has proceeded from a ſucceſſional and continual decreaſe of ſubterraneous heat; doubtleſs ſuch an event has tranſpired; an event of the moſt tremenduous nature, and whether couched under the *tropes* of Scripture hiſtory, which ignorant declaimers may find cauſe to cavil at, or to be collected from the aggregate natural materials, diſcovered in all quarters of the world, we have unequivocal arguments to ſupport an aſſertion, that this event cauſed an entire change in the features of the earth, ſuperficially as well as internally, and throughout all animal and vegetable life.

I do not mean to write a critique on M. le Comte de Buffon, nor am I ſo pedantic and curiouſly invidious, becauſe the human mind is naturally prone to an inquiry into firſt cauſes, to arraign his writings: whether the Comte, by ſeeing ſtrong corroborating proofs of a ſubterraneous fire, be induced to adopt a ſingular theory of comets, or to eject this world, which we inhabit from the body of the ſun, and render it habitable, by a periodical ſucceſſion of events; or whether he be pleaſed to aſſign good reaſons for other phyſical effects, which are daily preſenting themſelves to inquiſitive minds; we ſhould liberally applaud his laborious reſearches, and even reſpect his errors, ſhould we be enabled to detect them.

The order of events which he eſtabliſhes from the original liquefaction of the globe by fire, cannot

not therefore correſpond with the component ſtructure of the earth at this day; and I am well perſuaded the Comte will think with me, when he is pleaſed to take my inquiry into conſideration on the nature of that petrifaction* which I have treated of,

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* It is again neceſſary, in this place, to remark, that moſt of our indurated bodies have been formed at a certain period, when the earth was endued with a power of heat to operate, by the laws of attraction and affinity, upon the component parts of matter.

STONY, mineral and ſtalactacious concretions may be formed in caverns, where, by affinity, and the different laws of attraction obſervable in heterogeneous bodies, the air may diſpel the fluid vehicle and thus complete the conſolidation. Agglutination may alſo be produced from the ſpume of ſhell fiſh, and ſea animalcule, which operating on certain heterogeneous bodies, will unite them into a firm maſs. By this proceſs, certain ſoft land, which is often undermined by the ſea, will in the water become rock in a very ſhort period of time; but when we are informed, "that a human ſkeleton has been found in a ſtone quar-"ry entombed with relics deſcriptive of its date of inhumation; "and alſo "bones, armour, a buckle, and a Roman coin in a "ſtone pit;" to eſtabliſh a proof that ſuch ſolid ſubſtances were in a ſtate of ſoft texture, when the ſame were depoſited, we muſt diſſent from theſe recorded opinions, (ſee Mr. Whitehurſt's Inquiry, p. 15.) Induration of this nature cannot be performed in ſo ſmall a period of time; on critical examination theſe ancient remains would have been found inciſted in the rock. I have had various opportunities of making this remark, particularly in chalky ſoil, where I have of, being compleated with fire and water united ; and allow a ſeparate period in the antiquity of the globe, diſtinct from that regular order or ſeries of events, which in his opinion, has cauſed the diſtorted appearances which the earth at this æra preſents to us ; a period which entirely defaced the ſtructure of the globe, by a convulſive diſlocation in all its parts ; tranſmuting the interior compoſition of matter ; varying the original property of vivified nature, and altering the temperature of the atmoſphere in thoſe regions, where greater prolification and congeniality to the animal, the marine, perhaps

I have dug up ſome hundreds of human ſkeletons of equal antiquity. But when the above ingenious work deſcribes the vertebra of a crocodile, thirty feet long, found in the mountains of Canne, near Maeſtricht, in a ſtratum of ſand, ſtone, and other marine and terreſtrial bodies in various matter, deeply buried in the earth; ſuch teſtimonies can be received, and fair deductions eſtabliſhed. My opinion is, that theſe remains were of the antedeluvian world ; and ſo indurated, by a power which the earth within human inquiry ſeems no longer to poſſeſs ; ſee this more particularly treated of in page 38 of this work. Stalactacious matter, and ſome minerals may be produced under human obſervation ; but has the operation of indurated chalk, flint, &c. ever been noticed in its proceſs, or its induration ſatisfactorily accounted for ?

the aerial * and vegetable beings, at the early period of creation were eſtabliſhed.

M. Le Comte de Buffon obſerves, that all dales, vallies, mountains, and hills were produced by the united cauſes of fire and water; granted; but I apprehend not proceeding from a primordial event, which he thus explains: "When the earth firſt "received its conſiſtency, there aroſe on its ſur"face various aſperites, bloats, like thoſe produced "on a body of melted glaſs or other metals; this "firſt cauſe has then produced the earlieſt and "the higheſt mountains, which have their baſis in "contact with the interior ſolid maſs of the earth; "and under which, as in all other parts, there "would be found caverns which in different pe"riods of time would have been compreſſed; but "without conſidering this ſecondary event of the "caverns, it is certain, that in the primordial ages, "when the earth received its conſiſtency, it was

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* Mr. John Hunter, has, in his cabinet, the foſſil remains of a bird of a moſt extraordinary ſize; a bird of that enormous dimenſion, which apparently would exceed all human belief, eſpecially in theſe climes, when no ſimilar or even comparative ſpecies are now exiſting.

" furrowed in all its parts by the action of cool-
" ing. Afterwards, when the waters were diſcharged
" from the atmoſphere, which event took place, when
" the earth had become leſs intenſely hot, to diſtend
" the waters into an atmoſphere, then they fell
" upon the earth, to the amount of 2000 toiſes, or
" 12,000 feet; and during their long reſidence on
" the continents, the fluxes, refluxes, and cur-
" rents changed the diſpoſition and the form of the
" primitive mountains and vallies." I have here, with much brevity, ſelected the principal argument of this writer, and in anſwer, I ſhall as briefly ſtate, that if my argument on the nature of the induration of matter in which the remains of animal, marine, or vegetable productions are found, be fully conſidered, then this ſucceſſion could not be the caſe. It is a ſucceſſion of theſe events which I contend againſt, and for a *diſtinct convulſive period* which the earth has undergone, independant of that principal irruptive epoch which he aſſigns to the earth, produced by its early ages of incaleſcency. This ſucceſſion of waters on the continents could not alone produce by their depoſits, by attraction and the laws of affinity, the indurated matter, which is every where to be found

on the ſurface as well as in the bowels of the earth: earthquakes may have partially exploded great diſtricts of continents; volcanos may, by uniting their power, alſo have cauſed the condenſation of fluid, and detached bodies; but the component matter of the remains of ſea and land animals, almoſt univerſally prevalent; muſt have been produced at one deciſive period; at a period when the plaſtic and ſublime hand of a Deity had ſhapened animal life, and endued the world with a temperature far different to theſe latter ages of creation. Such a doctrine of the Comte de Buffon, may juſtly and naturally induce a great mind to arrange a ſyſtem of creation, but it muſt nevertheleſs oblige him to depart from Scripture definition, which though obſcure, yet if conſidered phyſically and profoundly, will eſtabliſh that epoch which I am now, though like every humble being, ſurrounded with the infirmities of human nature, but too much deficient in words and diction, to convey a powerful and energetic ſignificance of. God only can develop the myſtery: we may, as ſociety by degrees acquires an aggregate or compound knowledge of nature, approach to the truth of theſe abſtruſe inquiries; but we we muſt ſtill be forced to confeſs our incapacity to comprehend their perfection.

I SHALL now turn my thought, to this great and awful period, by which the earth has been ſo diſlocated and ſhook to its center.

SINCE the diſcoveries, that have been made on water, have tended to prove, that this fluid is not an elementary principle, but compoſed of air and earthly matter, many of our moſt able philoſophers have conceived this earth to have been created, or to have received its recent conſiſtency from water only; ſo that the world was originally a globe of water, condenſed by attraction and affinity; and in time modified to its preſent form; be it ſo, and let us alſo think with M. le Comte de Buffon, that it was in a ſtate of vitrified liquifaction. The Comte in this, has only adopted a ſecondary cauſe; and our water philoſophers may conceive their ſyſtem nearer to the firſt principle of created matter. They are all ſtill very, very far from the original great cauſe of all: thus I am ſure, my readers will agree with me, that all argument on this head, is only departing from a fit and conſiſtent inquiry; an inquiry which ſhould be confined to that epoch, which has reduced our terraqueous globe to its preſent conſiſtency; an inquiry, which, by fixing the principles of the learned may induce them to turn their thoughts to thoſe ſtudies, which may benefit mankind, and render their ſojourn in this earth, which they are treating of, conformable to rational precept, to civil and religious utility.

As there is no end to quotations and arguments, I ſhall only ſelect two paſſages from the Scriptures, to ſhow that an irruption of the waters had inundated the univerſe, and which inundation was produced by the elaſtic power of ſteam, produced by a ſubterraneous fire. Moſes has tranſmitted to us theſe words: "*The fountains of the great deep* "*were broken up*;" and what natural power was equal to this event but the one which I have here ſubmitted to the learned? The fire had cauſed a ſubtenſion of the waters, as alſo the beds on which they flowed, and in this caſe, until the convulſion had opened a free paſſage through the ſuperior regions of the globe, the waters moſt aſſuredly would have

have riſen to the greateſt altitudes, and again have deſcended, when the extraordinary contuſion had ſubſided, to the baſis, where, with ſome ſlight ſucceeding changes we now behold them. Who could not enter into an almoſt infinite detail, on this ſubject, and without much complicated argument, render all the natural appearances on the face of the globe ſubſervient to this pre-eminent convulſion? So much has already been ſaid on the ſubject, that I ſhall content myſelf with the buſineſs of reconciling theſe events to ſacred authority; and of ſtating ſome apparent errors of authors, for the more clear elucidation of ſuch an intereſting inquiry.

The CIV Pſalm has a ſtrong relation to the original creation of the earth; and the ſame may be obſerved in various paſſages of holy writ. It is not the inſpiration inſiſted on, of theſe writings, which ſhould turn the hearts and the minds of men, from contemplating ſuch very ancient and well connected authorities. If men are ſceptics in this particular, they ſhould not recede from corroborated teſtimony? And, to uſe a compariſon rather below the majeſty of theſe writings, I will aſk whether modern antiquarians will reject all the aſſertions of hiſtory recorded in monkiſh books, becauſe truths are couched under miracles and necromancy*?

HE LAID THE FOUNDATIONS OF THE EARTH; THAT IT NEVER SHOULD MOVE AT ANY TIME.

Here is conſiſtency given to the globe; that its interior parts ſhould not, after having received their ſolid ſtructure, be fractured by any concuſſion; nor have they been; as the convulſive operations were performed, remote from its center.

THOU COVEREDST IT WITH THE DEEP LIKE AS WITH A GARMENT: THE WATERS STAND IN THE HILLS.

Is not this a confirmation of the conſiſtency and quality of the earth, in its firſt ages, before the general erruption was produced?

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* See Gildas, Bede, Jeffrey of Monmouth, &c.

AT THY REBUKE THEY FLEE: AT THE VOICE OF THY THUNDER THEY ARE AFRAID.

Here is all that diſorder, that terrible concuſſion produced, which I am contending for. The waters are violently agitated by the elaſtic power of fire and water united, within the bowels of the earth. *The voice of thy thunder.* What a ſublime ſimile of ſubterrene exploſion!

THEY GO UP AS HIGH AS THE HILLS, AND DOWN TO THE VALLIES BENEATH: EVEN INTO THE PLACE WHICH THOU HAST APPOINTED FOR THEM.

Who, but a great natural philoſopher, could have couched the awful period of the general deluge under ſuch a correct and *religious* ſimile? And does it not critically explain the cauſe of a general and mighty convulſion? an epoch ſo tremenduous, which could not fail of being known by the enlightened part of the world in theſe remote ages. What author can preſume, in this caſe, to contend with Scripture authority, and hazard his

unfounded reaſoning to a world, alas! but too ſenſible of improper and miſtaken impreſſions*.
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* See Toulmin on the the Antiquity and Duration of the World, page 160: "The inundations of the ocean, that have been eſteemed univerſal, and recorded in the traditions of various annals of mankind, would ſeem here to ſolicit ſome attention. Partial encroachments of the ſea, which have ever exiſted, muſt alone have given riſe to theſe vague and inconſiſtent narrations. In an uncultivated age, when men were ignorant of the eſtabliſhiſhed laws of nature, every little incident was exaggerated, and might have been ſufficient to have given birth to the moſt abſurd and incredible conjecture."

THESE partial inundations have doubtleſs tranſpired, and are evidently recorded. Many of them have, in remote periods of time, produced terrible devaſtations; but theſe inundations were by no means partial encroachments of the ſea, ſee Diod. Strabo, Pliny, and various other ancient authors. Fiction alſo may have adorned the mythology of the ancients, but truth is, by the diſcerning part of mankind, ſoon perceived in their writings. But theſe partial inundations, have no relation to the general and great epoch, which is ſo fully exemplified by natural memorials in every quarter of the globe; by which all the face of the earth has been changed, as we now behold it; and the teſtimonies of which the above learned author ſeems thus to reject: "*That the inſufficiency of the water of the ocean, to cover the whole earth*; the unnatural ſuppoſition of a great and intereſting part of nature, being at once deſtroyed, the inconſiſtent manner in which all ſuch ſtories are ever related, impreſs us
with

When gentlemen write, they ſhould firſt be founded in practical knowledge, and not alone in the writings of authors, who, even the beſt of them, are too replete with error, the natural property of human nature, to be truſted. They ſhould compare their own critical ſtudies to the conformity of ſuch writings, and thus endeavour to approach to truth; and then let me again repeat it, they will

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"with inſurmountable incredulity. In ſhort, *they never can be* "*received, never can be thought reconcileable to reaſon, by the ſenſible and* "*enlightened part of the human ſpecies.*" When gentlemen of talents, thus peremptorily argue, with warmth, againſt the ſacred teſtimony which I have taken but little pains to juſtify, they will not ſurely be ſurprized to find their obſervations attacked. Mr. Toulmin has been faſcinated with his ſubject; but reflection will make him a convert to a more competent doctrine: *Drink deep, or taſte not.* As the above writer, is not explicit in this paſſage which I have quoted, or the one which follows it, the ambiguity will admit of my conſtruction; and leaſt a doctrine, which is erroneous in itſelf, and of much prejudice to ſociety, ſhould be inculcated, I am ſurely at liberty to infer, from this remark, "That our immediate predeceſſors were firmly and univerſally "perſuaded of the real exiſtence of *the mereſt phantoms of imagi*"*nation*;" that he has the ſacred teſtimonies in view, and as ſuch I have pointed my preſent argument; which the moſt unprejudiced reader muſt allow to have the ſtricteſt conformity to the principles of my foregoing diſſertation; and which have been framed on the immutable laws of nature, which he alſo, though I am ſorry to ſay, in a very miſtaken manner is contending for.

have freſh cauſe to admire the valuable and true expoſition of ſacred documents. But to finiſh this expoſition in this laſt verſe, which I have quoted, the waters are ſaid to have deſcended *to a fixed*, a *ſettled abode:* ſince which, agreeing with profane writers, and with modern eſſayiſts, that a Samothracian deluge has prevailed, other deluges alſo, and that the ſeas have laved in a partial manner certain continents; but theſe events, I muſt again aſſert, are perfectly diſtinct from that univerſal commotion which gave authority to the Pſalmiſt for his wonderful deſcription of that tremenduous event.

I do not hold myſelf, ſo literally bound by the ſtrict aſſertion of Moſes as to ſuppoſe that all the earth was effectually covered by this great eruption of the waters, though from ſuch a cauſe as I have here repreſented, doubtleſs an univerſal flood might have prevailed, and have been lifted up over the whole earth. The Almighty may have willed that this great lawgiver, the leader of an ignorant and inquiſitive multitude, ſhould frame his diſcourſe to them, in ſuch terms as were beſt adapted to untutored minds. The end was accompliſh-ed; the true and only God was adored; and a religious veneration for his omnipotency inſtilled into their minds.

THAT mind muſt be bounded indeed, which cannot perceive the ſolemn truths of nature, concealed under the influence of apparent ſorcery and witchcraft prevalent in former ages, and ſo natural to be received by all denominations of men, who are ſenſible of their feeble and dependent exiſtence *. Theſe opinions of our foreſathers are no obſtacles to the liberal and ſerious inquirers after truth. We ſhould not therefore diſcard the whole for a part; and becauſe it may flatter the whim of

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* When Virgil deſcribes the aſtoniſhment of the Thracians, Rhodope and Iſmarus, at Orpheus, when he was explaining the origin of creation; it is eaſy to obſerve the influence of ancient mythology on ſound phyſical argument.

Namque canebat uti magnum per inane coacta
Semina, terrarumque, animæque, mariſque, fuiſſent,
Et liquidi ſimul ignis: ut his exordia primis,
Omnia, et ipſe tener mundi concreverit orbis.
Tum durare ſolum, et diſcludere Nerea ponto
Cæperit, et rerum paulatim ſumere formas.

ECCLOGA VI.

ſome ſuperſicial moderns to militate againſt the Moſaical records, we ſhould not aſſert other doctrines, in defiance to reaſon and ſacred teſtimony. If therefore we be inclined to ſay that a deluge was univerſal, this deluge may not have prevailed to that degree of devaſtation as to have ſubmerged all the nations of the world; our new diſcovered iſlands may have been ſeparated from main lands, and the inhabitants preſerved upon them at that period. Noah may have been forewarned by a conception of this approaching event; and whether by the direct inſpiration of God or his own ſagacious preſage, of ſome approaching convulſion on the face of the globe, he may have conſtructed a ſecure retreat from the inundation of the waters; his poſterity may have recorded an event, which more particularly related to that quarter of the world from whence letters and civil ſociety firſt originated. Thus much I am induced to depart from the exact letter of ſacred writ to recall the erring genius of the age to the true and great tenet of their philoſophical reſearches and their religious obligations.

I SHALL now conclude this ſtricture with a teſtimony of a few prophane writers. Diodorus Siculus

culus reports, that it was the opinion of many perſons of his time, that the Deucalion flood was general, and that all its inhabitants periſhed, and were again reproduced ; ſome indeed, ſays he, only believed the greateſt part were deſtroyed. * This teſtimony is ſufficient, without recurring to many others which are to be met with among the ancients, that they held a general belief of an univerſal deluge ; ſuch as Lucian in his book concerning the Goddeſs of Syria ; Beroſus's hiſtory of Alexander, whoſe writings were preſerved by Cyril ; with a multitude of ancient authors, who bear record of this event, independent of the account tranſmitted by Moſes.

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* See chap. I.

REMARKS

ON

MR. WHITEHURST's INQUIRY ON THE ORIGINAL STATE AND FORMATION OF THE EARTH.

THE argument of this inquiry is founded on the ſame unerring principle of Sir Iſaac Newton, as M. le Comte de Buffon has eſtabliſhed for the doctrine which he advances in his Supplement to his Natural Hiſtory: that the equatorial exceeds the polar diameter of the earth in ſuch proportion as the velocity of its diurnal rotation requires: hence it is obvious that the natural law of any body, governed by ſuch a revolution on its axis, muſt have acquired its oblate ſpheroidical form when in a ſtate of FLUIDITY. Therefore as the earth correctly agrees with the laws of all revolving bodies, we are at liberty to conclude that its diurnal motion has undergone very little variation; and hence we are authoriſed to eſtabliſh this *fixed principle* from the unerring laws of nature, that it has performed EQUAL ROTATIONS IN EQUAL TIMES, THROUGHOUT ALL AGES OF THE WORLD.

It will not require much retroſpect to obſerve that he has, with a true philoſophic mind, produced a ſtrict mathematical argument to ſhow cauſe why the climates of the earth could not have been varied by any polar alteration of the globe. On this his principal argument in his inquiry turns; and it is to this, now no longer diſputed point, I hope, that a univerſal eruption of the waters, and univerſal convulſion of matter, can be eſtabliſhed; which cauſe alone will be ſufficiently ſatisfactory to produce a change of climature to thoſe regions, where the foſſil antediluvian remains are found, many of which are proved to be in nature and magnitude no longer analogous to any ſpecies now recent on the earth *.

I SHALL now beg leave to ſhow the conformity of this inquiry of Mr. Whitehurſt with M. le Comte de Buffon, and alſo where their diſagreement lies, by which we ſhall be enabled to ſelect truth from both writers, and by ſome other trifling combinations, ſtate a clear principle for our philoſophical reſearches.

M. le Comte de Buffon infers from the compreſſion of the earth at its poles and its elevation at the equator, that it muſt have been in a ſtate of liquefaction by fire; and to prove his argument he ſhows, by very ſtrong teſtimonies, that the native rock of the earth was of a compact and denſe † ſubſtance

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* See the foregoing Diſſertation.

† See experiments of Dr. Maſkelyne, in his report to the Royal Society, the Schehallien mountain in Scotland, a compact and ſolid rock; and by which he proves that the mean denſity of the earth is double to that of the mountain.

ſubſtance of the nature of vitrified matter*; obſervable in the granite and porphyry rocks, on ſome of the higheſt mountains. On this hypotheſis

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* I HAVE thought proper to ſubjoin in this place, for the more elaborate peruſal of the reader, and for the ſake of impartiality, the Comte's experiments on certain bodies which acquire conſiſtency and ſolidity, by the ſeparate action of fire and water. See his Epo. de la Natur. p, 451, 12mo. edit.

J'AI fait broyer des grès de différens degrés de dureté, & je les ai fait tamiſer en poudre plus ou moins fine, pour m'en ſervir à couvrir les cémentations dont je me ſers pour convertir le fer en acier ; cette poudre de grès répandue ſur le cément, & amoncelée en forme de dôme de trois ou quatre pouces d'épaiſſeur, ſur une caiſſe de trois pieds de longueur & deux pieds de largeur; ayant ſubi l'action du feu violent dans mes fourneaux d'aſpiration pendant pluſieurs jours & nuits de ſuite ſans interruption, n'étoit plus de la pouſſière de grès, mais une maſſe ſolide, que l'on étoit obligé de caſſer pour découvrir la caiſſe qui contenoit le fer converti en acier bourſouflé ; en ſorte que l'action du feu ſur cette poudre de grès, en a fait des maſſes auſſi ſolides que les grès de médiocre qualité qui ne ſonne point ſous le marteau. Cela m'a démontré que le feu peut, tout auſſi-bien que l'eau, avoir aglutiné les ſables vitreſcibles, & avoir par conſéquent formé les grandes maſſes de grès qui compoſent le noyau de quelques-unes de nos montagnes.

" JE ſuis donc très perſuadé que toute la matière vitreſcible dont eſt compoſée la roche intérieure du globe, & les noyaux de theſis he accounts for the variation of climate and the foſſil remains of animal, marine, and vegetable ſubſtances found in theſe quarters of the globe,

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ſes grandes éminences extérieurs, ont été produits par l'action du feu primitif, & que les eaux n'ont formé que les couches inférieures & acceſſoires qui enveloppent ces noyaux & qui ſont toutes poſées par couches parallèles, horizontales ou également inclinés, & dans leſquelles on trouve des débris de coquilles & d'autres productions de la mer.

" Ce n'eſt pas que je prétende exclure l'intermède de l'eau pour la formation des grès & de pluſieurs autres matières vitreſcibles ; je ſuis au contraire porté à croire que le ſable vitreſcible peut acquérir de la conſiſtance, & ſe réunir en maſſes plus ou moins dures par le moyen de l'eau, peut-être encore plus aiſément que par l'action du feu ; & c'eſt ſeulement pour prévenir les objections qu'on ne manqueroit pas de faire, ſi l'on imaginoit que j'attribue uniquement à l'intermède de l'eau, la ſolidité & la conſiſtance du grès & des autres matières compoſées de ſable vitreſcible. Je dois même obſerver que les grès qui ſe trouvent à la ſuperficie ou à peu de profondeur dans la terrre, ont tous été formés par l'intermède de l'eau ; car l'on remarque des ondulations & des tournoiemens à la ſurface ſupérieure des maſſes de ces grès, & l'on y voit quelquefois des impreſſions de plantes & de coquilles. Mais on peut diſtinguer les grès formés par le ſediment des eaux, de ceux qui ont été produits par le feu, ceux ci ſont d'un plus gros grain, & s'égrainent plus facilement que les grès dont l'agrégation des parties eſt dû à l'intermède de l'eau. Ils ſont plus ſerrés, plus compactes, les grains qui les compoſent ont des angles plus vifs, & en globe, which are now no longer adapted by their temperature to their exiſtence; various other changes he explains on this principle, which cannot

en général ils ſont plus ſolides & plus durs que les grès coagulés par le feu.

"Les maitères ferrugineuſes prennent un très-grand degré de dureté par le feu, puiſque rien n'eſt ſi dur que la fonte de fer, mais elles peuvent auſſi acquérir une dureté conſiderable par l'intermède l'eau; je m'en ſuis aſſuré en mettant une bonne quantité de limaille de fer dans des vaſes expoſés à la pluie; cette limaille a formé des maſſes ſi dures qu'on ne pouvoit les caſſer qu'au marteau.

"La roche vitreuſe qui compoſe la maſſe de l'intérieur du globe eſt plus dure que le verre ordinaire, mais elle ne l'eſt pas plus que certaines laves de volcans, & beaucoup moins que la fonte de fer, qui n'eſt cependant que du verre mêlé de parties ferrugineuſes. Cette grande dureté de la roche du globe indique aſſez que ce ſont les parties les plus fixes de toute la matière qui ſe ſont réunies, & que, dès le temps de leur conſolidation, elles ont pris la conſiſtance & la dureté qu'elles ont encore aujour-d'hui. L'on ne peut donc pas argumenter contre mon hypothèſe de la vitrification générale, en diſant que les matières réduites en verre par le feu de nos fourneaux, ſont moins dures que la roche du globe, puiſque la fonte de fer, quelques laves ou baſaltes, & même certaines porcelaines ſont plus dures que cette roche, & néanmoins ne doivent, comme elle, leur dureté qu'à l'action du feu. D'ailleurs les élémens du fer & des autres minéraux qui donnent de la dureté aux matières not poſſibly be brought into the compaſs of this work.

Mr. Whitehurſt having ſtated the ſame principles as M. le Comte de Buffon, on the oblate ſpheroidical form of the earth, conſiders whether its fluidity was owing to any diſſolvent principle, or to the firſt aſſemblage of its component parts. He ſays it will be readily granted that the earth was brought into exiſtence, either in a ſolid or in a fluid ſtate; and naturally argues, that if created in a ſolid ſtate it muſt have been diſſolved by ſome *univerſal diſſolvent principle*: “ But as no ſuch

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res liquéfiées par le feu ou atténuées par l'eau, exiſtoient ainſi que les terres fixes dès le temps de la conſolidation du globe; & j'ai déjà dit qu'on ne devoit pas regarder la roche de ſon intérieur comme du verre pur, ſemblable à celui que nous faiſons avec du ſable & du ſalin; mais comme un produit vitreux mêlé des matières les plus fixes & les plus capables de ſoutenir la grande & longue action du feu primitif, dont nous ne pouvons comparer les grands effets que de loin, avec le petit effet de nos feux de fourneaux; & néanmoins cette comparaiſon, quoique déſavantageuſe, nous laiſſe apercevoir clairement ce qu'il peut y avoir de commun dans les effets du feu primitif & dans les produits de nos feux, & nous démontre en même temps que le degré de dureté dépend moins de celui du feu que de la combinaiſon des matières ſoumiſes à ſon action.

" principle is yet known to exiſt in nature, he con-
" cludes that its fluidity was owing to *the firſt*
" *aſſemblage* of its component parts, and not to
" any ſubſequent ſolution. Hence it appears that
" the earth had a beginning, and cannot have
" exiſted from eternity, as ſome perſons have
" imagined*."

THIS opinion of Mr. Whitehurſt has been patiently formed from long laborious and practical ſearches into the bowels of the earth; and it does the greateſt honour to human judgement, when we thus behold an inquiſitive mind exploring thoſe regions remotely concealed from the generality of men; contemplating the foſſil productions entombed in various ſolid ſubſtances; analyſing the component matter of the earth; and from an aggregate of theſe ſtudies, juſtifying the laws of nature and of God, by ſhielding the oldeſt record of human learning from the miſrepreſentation of quacks, and the ſallies of falſe reaſoners, which are now too prevalent in the faſhionable world:

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* This is a ſufficient anſwer to D. Toulmin on the Antiquities and Duration of the World, 1789; publiſhed ſince Mr. Whitehurſt's Enquiry.

but his practical obſervations are ſtrictly conformable to the writings of almoſt all our prophane writers of any conſequence, a circumſtance which cannot fail of affording the higheſt ſatisfaction to the learned *. He has happily concluded his ſecond chapter, after having ſtated the opinions of the Egyptians, and with an obſervation, which is very probable, that the ancient nations, in their doctrine of creation muſt have adopted their principles either from revelation or reaſon; and if the latter, they muſt have

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* Zeno affirms that the Chaos in Heſiod is water of which all things were made; the water ſubſiding made *mud*, and the mud congealing made ſolid earth. Zeno was a Phœnician, and according to Euſebius, in the book of his Preparation, he deſcribes the Theology of the Phœnicians to be thus: matter had a beginning; and the ſpirit deſcribed by Moſes as breath, which is called by the Hebrews, מרחפת Merachepheth, ſignifying love, produced the *uωτ* of the Greeks, which ſome call *mud* from whence all things proceeded; *μυδος* which in Hebrew, ſignifies *Tehom*; in Greek *αϐυσσος* an abyſs already in motion. This expreſſion in the poet Ennius, has the ſame implication. *From muddy Tartarus a birth gigantic ſprung.* Appo. Rhod. ivth of the Argonauticks, ſays *earth was produced from mud*; much more might be ſelected to ſhew this prevailing opinion of the Antients, but as I am not writing a regular diſſertation on the ſubject, I content myſelf only with ſome curſory quotations more of which may be ſeen very learnedly treated in le Clerc's notes to Grotius *de verit. Chriſt. Relig.*

been acquainted with the principles of the Newtonian philoſophy; as the chaotic ſtate of the earth could not be deduced from any other doctrines yet diſcovered.

FROM the hypotheſis of M. le Comte de Buffon, I have remarked that no general or univerſal flood could have been produced, ſeeing that a ſubterraneous fire muſt have ſubſided in part ſo as to have admitted of the general depoſit of the land and water productions; and in this caſe the general elevation of the waters over the earth, could not have prevailed without this agent: in my opinion it therefore ſeems evident that by ſome cauſe a ſubterraneous fire*, muſt have been produced to operate a general flood, ſubſequent to the firſt coheſion of matter, either from its ſtate of fluidity by fire or by water.

CONCLUSION.

THE earth therefore may have been originally in a ſtate of fluidity by water, which, by the revolution round its axis occaſioned its component parts to be conſolidated by the means of its affinities*; and by the increment of heat from a degree of moiſture and dryneſs it may have produced a ſubterraneous fire; hence all its various revolutions may have originated: it may thus have been in a ſtate of fuſion, and have reduced its matter to a vitrified ſtate; it might have been in contact with a comet, as ſome philoſophers have ſuppoſed; the incaleſcency may have ſuſpended its waters over it; the earth may have cooled; the waters may have fallen upon it again; and ſo we may continue to reaſon without end; but it is finally obvious in this particular, that M. le Comte de Buffon, and Mr. Whitehurſt may be made to agree in their hypotheſis, that Fire and Water have been the cauſe of all the convulſions which have diſordered the face of the globe; and to which I think myſelf happy, in having added ſome further teſtimony; in hopes that my labours may ultimately tend to reſtore the minds of a certain deſcription of men, to a ſenſe of phyſical truths and religious precepts.

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* See the foregoing diſſertation.

§ See M. Macquers El. of Chemiſtry, vol. I. p. ii.

FINIS.

E R R A T A.

P. 4. line 2 of the note, for *vegitable* read *vegetable*.

P. 7. l. 5. for *one* read *two*.

Ditto, l. 7. for *grameniverous* read *graminivorous*.

Ditto, l. 8. for *carniverous* read *carnivorous*.

P. 8. l. 15. for *boney* read *bony*

P. 33. l. 21. for *ſtallactacious* read *ſtalactical.*

P. 35. l. 20 in the note, for ΨΥΚΗ read ΨΥΧΗ.

P. 66. l. 7. for *in* read *on*.

P. 23. for *perforated with a braſs ring, which the Pagan,* &c. read *when perforated with a braſs ring, the Pagan,* &c.

P. 26. l. 16. *for the latter totally deprived of any teeth*, read *the latter deprived of any on its ſide*.

H. M.